ROYAL BOTANIC GARDENS, KEW.

BULLETIN

OF

MISCELLANEOUS INFORMATION.

ADDITIONAL SERIES V.

THE WILD FAUNA AND FLORA

OF THE

ROYAL BOTANIC GARDENS, KEW.

LONDON:
PRINTED FOR HIS MAJESTY'S STATIONERY OFFICE,
BY DARLING & SON, LTD., 34-40, BACON STREET, E.

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PREFACE.

"Kew, as it exists to-day, was formed by the fusion of two distinct properties or domains, both Royal, but with entirely different histories. They correspond roughly to the west and east halves of the present gardens. The western half was known as Richmond Gardens. The eastern half corresponds in great part to the grounds of Kew House, and to this the name of Kew Gardens was originally confined. The two properties were separated by Love Lane, the ancient bridle road between Richmond and Brentford Ferry." (*Kew Bulletin*, 1891, p. 281.)

Richmond Lodge or House had been granted in 1707 by Queen Anne to the Duke of Ormonde. It was purchased from his family by George II. when Prince of Wales. It was a favourite residence of Queen Caroline, and was ultimately pulled down by George III. about 1771.

Kew House had been the residence of Lord Capel of Tewkesbury, a brother of the Earl of Essex. It was leased by Frederick, Prince of Wales, and was the home of his widow, the Princess Augusta of Saxe-Gotha, till her death. In 1759 she commenced the scientific history of Kew by establishing a Botanic or, as it was then called, a Physic Garden. George III. acquired the property, and in 1803 pulled down Kew House also. He obtained two Acts of Parliament empowering him to close Love Lane, but this was apparently not finally accomplished till 1802.

The area of the Gardens as they at present exist is something under half a square mile. While the western half shows for the most part little evidence of the soil having been ever disturbed by cultivation, beyond being thickly planted with trees, this is not the case with the eastern half, much of which has at one time or another apparently been brought under the plough.

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In 1873 a member of the Kew staff (Curator from 1886 to 1901), Mr. George Nicholson, F.L.S., compiled a list of the native (and a few naturalised) plants occurring spontaneously at Kew. This was published in the *Journal of Botany* for 1875. Mr. R. I. Lynch, Curator of the Botanic Garden, Cambridge, also formerly a member of the Kew staff, materially contributed to its completeness from his own observations, and the late Lord de Tabley, better known to botanists as the Hon. John Leicester Warren, was keenly interested in it.

In the *Kew Bulletin* for 1897 (pp. 115-167) a first attempt was made to catalogue the Mycologic Flora by Mr. G. Massee, F.L.S., a Principal Assistant in the Herbarium. The following passage is quoted from the prefatory note :—

"Of the Royal Gardens themselves some 100 acres is little disturbed by any kind of cultivation, and it has certainly remained so for at least a century and a half. Some portions may never possibly have been subjected to cultivation at all. It is not surprising therefore that in the background of horticultural treatment there still subsists a wild fauna and flora of no inconsiderable dimensions. This, as opportunity offers, it is proposed to work out and catalogue from time to time."

The Moss Flora was contributed to the *Bulletin* for 1899 (pp. 7-17) by Mr. E. S. Salmon, F.L.S.

Meanwhile Mr. Nicholson had steadily devoted his leisure hours to the comprehensive scheme contemplated in 1897. He enlisted the assistance of a number of scientific friends, specialists in various groups, to whom he communicated his enthusiasm for the work and without whose efficient help it would, even in a tentative form, have been impossible of achievement.

I looked forward to this in Mr. Nicholson's hands with much interest and satisfaction. Unhappily, the breakdown of his health and his consequent retirement from the post of Curator in 1901 compelled him to abandon a labour to which he no longer felt equal. As there was no immediate chance of anyone carrying it on with Mr. Nicholson's energy, I decided to publish the material he had accumulated as at any rate a starting point for further research. I placed the papers in the hands of Mr. Pearson, M.A., F.L.S., who in the same year had been appointed an Assistant.

He succeeded in preparing them for, and partially seeing them through the press when he in turn was obliged to abandon the task owing to his leaving for Cape Colony in 1903 to take up his duties as Professor of Botany in the South African College. Failing other assistance, I found it impossible to carry it to completion till I had myself been relieved of administrative duties.

It appears to me that it is of considerable interest to show what a vast number of forms of life of the most varied kind may exist together on what is relatively a microscopic speck of the earth's surface. This would be in the present case even more striking if the enumeration were more complete than it can pretend to be. Some groups have not been worked at all; this is the case with the *Diptera*, and of the *Hemiptera* only the *Coccidæ* have been catalogued. Others, it is obvious, have been only touched superficially. The publication of what has been done may encourage working naturalists to correct errors and to accomplish, as perhaps has never been done yet, a complete census of every form of life occurring spontaneously in a small but well-defined area.

I am glad to take the opportunity of acknowledging gratefully the assistance which has been given to those who have successively had a hand in the work by a very large number of individual workers in various branches of zoology and botany. Some of the most important are enumerated in the following "Table of Contents." I see from the mass of correspondence which has accumulated that there are a host of others, many personally unknown to me, who have cheerfully rendered the assistance which has been demanded of them on special points. I find it impracticable to specify them all individually, and can only beg them collectively to accept my appreciation of their aid.

W. T. THISELTON-DYER.

Kew, February, 1906.

The abbreviations used are as follows :

A. Arboretum. This includes the whole of what was formerly termed "pleasure grounds."

B. Botanic garden. This division was formerly separated from the arboretum by a wire fence, which ran near Unicorn Gate, by north end of Pagoda vista, along eastern side of ash collection to Palace lawn.

P. Palace and herbarium grounds.

Q. Queen's Cottage grounds.

R. Rock-garden.

Strip. This is the piece of ground between the wall and the Thames, extending from end of herbarium grounds to the end of Queen's Cottage grounds.

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THE WILD FAUNA AND FLORA

OF THE

ROYAL BOTANIC GARDENS, KEW.

I.—FAUNA.

1. MAMMALIA.

INSECTIVORA.

Erinaceus europaeus, *L.* "Hedge-hog." Not uncommon in Q. and elsewhere in the grounds.

Talpa europaea, *L.* "Common Mole." Formerly abundant in Q.

CARNIVORA.

Canis vulpes, *L.* "Fox." About 25 years ago a pair of foxes took up their abode in Q. and remained there for some time. Ultimately one was captured and the other left the neighbourhood. In 1900 a male fox escaped from confinement in Mortlake and remained at large in the gardens for two or three days.

Mustela erminea, *L.* "Stoat" or "Ermine." Not uncommon in Q.

M. vulgaris, *Erxleben.* "Weasel." Not uncommon in A. and Q.

RODENTIA.

Lepus europaeus, *Pallas.* "Common Hare." Two were shot about 25 years ago, one in P., the other in A. In 1899 a third was picked up dead. It had evidently been killed by eating twigs of *Coronilla Emerus.*

L. cuniculus, *L.* "Rabbit." In spite of every effort to exterminate it, this animal still maintains a footing in A. and Q.

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Sciurus vulgaris, *L.* "Squirrel." Common in A. and Q.

Mus sylvaticus, *L.* "Wood-mouse." Abundant in rockery and elsewhere. Crocus corms form a favourite food.

M. musculus, *L.* "Common Mouse."

M. decumanus, *Pallas.* "Brown Rat."

Microtus agrestis, *Lataste.* "Common Field Vole."

M. glareolus, *Lataste.* "Bank Vole." Less common than the preceding.

M. amphibius, *Schrank.* "Water Vole." Near the lake and along the Ha-Ha.

CHEIROPTERA.

Vesperugo pipistrellus, *Schreber.* "Common Bat" or "Pipistrelle." Common in roofs of buildings.

V. noctula, *Schreber.* In hollow trees in A.

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2. AVES.

By W. H. Hudson.

The list of species here given is not so long as some of the lists made at other points on the outskirts of the metropolis; and there cannot be a doubt that many species could have been added if some person had thought it worth his while to keep a very strict watch on the birds for a period of several years, and recorded every species seen, including birds on passage travelling at a considerable height from the earth and not very well identified. The species here named are those only which inhabit or are regular visitants to the gardens, together with such rarities as have from time to time been observed by some of the officials. Thus, we find that so common a winter visitor as the redwing has not been included, yet I have been told by an old workman employed in the gardens that in some seasons he has noticed numbers of redwings congregating at roosting time in the Queen's Cottage Grounds.

There are some facts about the wild bird life of Kew besides those contained in the notes which are worth recording here. One is the extraordinary abundance of the carrion crow at this point. This crow is, generally speaking, the most persecuted fowl in the kingdom, but in the neighbourhood of London, especially on the west and south-west side and along the river, he is little molested and has greatly increased in recent years. In the gardens at any hour of the day and all the year round his "voice of care" may be heard from the tall tree-tops, and his

heavy black form seen as he slowly wings his way from tree to tree. But he is most abundant in the winter, when he is more than at other seasons a river-side bird.

One evening during the spell of intense cold in February, 1902, I stood for an hour in the Queen's Cottage Grounds watching a mixed gathering of birds on the muddy edge of the river between the Gardens and Syon Park. Besides small birds, mostly blackbirds and song-thrushes, there were in the crowd twenty-one black-headed gulls, two herons, thirty-two common or carrion crows, one hooded crow, and one moorhen. Most of the crows were very busy just before sunset searching in the mud for something to eat, wading in the shallow water, prodding the mud and dragging out half-buried old rags and weeds and turning them over. It was a strange bird-gathering to see at a spot so near to London, but the thirty-two crows mixed in this group were not all the birds of that species at the spot. Others were cawing from the trees among which I stood, and a little distance up stream I could see a second gathering composed of about twenty-five common crows and one hooded crow.

It may be mentioned that the heron and carrion crow are the two largest wild birds that survive as breeding species in the home counties. The herons which breed close by in Richmond Park are constant visitors to Kew Gardens.

Another interesting point to be noted relates to the local habits and movements of the Kew birds. Thus, the green woodpecker has his favourite haunt in the tall trees to the right of the Queen's Cottage, where his drumming and "loud laugh" may be heard throughout the summer. There, too, the jays are seen and their strident screams most often heard; and the lesser spotted woodpecker, that most elusive of woodland species, is seldom far off. Of the summer migrants the tree-pipit, lesser whitethroat, and sedge warbler return year after year to the same tree, bush, and cluster of reeds. Even so common and universal a species as the chaffinch has the habit of uniting in small parties and flocks at one spot, a little to the west of the temperate house. This house itself has now become the home of a number of birds—robins, hedge-sparrows, and blackbirds—who have an odd preference for an indoor life. The most interesting species in this connexion is the pied wagtail. Several pairs breed annually in the gardens, but in winter the local birds are joined by a number of others from outside, and all roost together in a dense clump of bamboos growing on the small island in the ornamental water. The birds congregate in September, the number varying in different years from about 75 to about 150, and they roost nightly at this spot until spring weather in March breaks up the company.

It is an exceedingly pretty sight when these graceful birdlings come in towards evening to spend an hour in play, pursuing one another through the air and running about in scores on the clean walks, until at dusk they drop by twos and threes and half-dozens into their green safe shelter. Probably but for this ideal tiny roosting-place most of these birds would migrate in winter.

It remains to speak of one other fact, perhaps the most interesting of all—the large proportion of songsters among the species

that are residents in, or regular summer visitants to, the Gardens. These include our three common thrushes; the nightingale, hedge-sparrow, redstart, goldcrest, robin, and wren; seven species of warblers; the swallow and martin; four species of tit; the starling, chaffinch, greenfinch, and bullfinch; the pied wagtail and tree-pipit. Here then are twenty-eight songsters, without including the skylark and meadow-pipit which may be heard from the gardens singing in the adjacent meadows.

To the volume of beautiful bird sound produced by all these true singers must be added the calls, songs, and other notes, some highly musical, of such species as the daw and jay, nuthatch, ring-dove, turtle-dove, green woodpecker, cuckoo, wryneck, little grebe, and many others. Even in a perfectly rural district it would not be easy to find so great a variety in the same space; and it is indeed this variety and abundance of bird music which to the lover of nature gives to Kew Gardens its principal charm. This charm, and its value as a place of refreshment and delight to the millions of London, it will retain so long as the open spaces which abut upon it—Old Deer Park and Syon Park—continue open, and the Queen's Cottage ground is kept, as the late Queen wished it to be kept, in its present state, as a fragment of unspoilt wildness, and the favourite haunt and breeding-place of all the most attractive species of birds which inhabit Kew.

PASSERES.

Turdus viscivorus, *L.* "Missel-Thrush." Resident throughout the year; not so common as throstle and blackbird.

T. musicus, *L.* "Throstle or Song-Thrush." Common throughout the year. Frequently breeds in conservatory and Winter Garden—making use of ventilators for exit and entrance.

T. pilaris, *L.* "Fieldfare." A winter visitor. In some seasons a considerable number have been seen feeding on fruits of *Crataegus*, &c.

T. merula, *L.* "Blackbird." Abundant throughout the year. Several years ago an albino male was noted: it mated and the nest was built in a *Berberis* bush near the Lion Gate. The bird was very shy and kept out of sight as much as possible; its young were more or less marked with white. The species has also bred in bushes in conservatory and Winter Garden.

Pratincola rubicola, *L.* "Stonechat."

Ruticilla phoenicurus, *L.* "Redstart." This is a regular visitor and may be seen in A. and Q.—where it breeds.

Erithacus rubecula, *L.* "Robin." Very common. Builds sometimes in plant houses on the stages close to the paths.

Daulias luscinia, *L.* "Nightingale." From about middle of April onwards—principally in P. and Q.—where nests have been observed.

Sylvia cinerea, *Bechstein.* "Whitethroat." Common in A. P. Q. The young of the cuckoo have been observed in nests of this species.

S. curruca, *L.* "Lesser Whitethroat." The nests of this species have been frequently seen in brambles, &c., in Q., not so common as the last-named.

S. atricapilla, *L.* "Blackcap." More frequent in Q. than in any of the other divisions.

S. hortensis, *Bechstein.* "Garden Warbler." As common as the blackcap.

Melizophilus undatus, *Boddaert.* "Dartford Warbler." Twenty-five years ago this species used to breed amongst dense furze bushes in A. Has not been noticed now for many years.

Regulus cristatus, *K. L. Koch.* "Golden-crested Wren or Gold-crest." The pretty pendent nest of this species is generally found in yew trees at Kew—one suspended from the lower branch of a tree at a height of little more than 6 ft. from the ground in one of the most frequented parts of the gardens, was apparently never discovered by the public and remained quite undisturbed.

Phylloscopus rufus, *Bechstein.* "Chiffchaff." Invariably the first of the summer songsters heard in the gardens. Common.

P. trochilus, *L.* "Willow-Wren." This quickly follows the chiffchaff and is the commonest warbler in the gardens.

P. sibilatrix, *Bechstein.* "Wood-Wren." A pair came annually until 1899 to the oak and beech wood near Temperate House, where the song of the male was heard all day long in summer.

Acrocephalus streperus, *Vieillot.* "Reed-Warbler." By the lake and along river bank. Heard by Mr. W. H. Hudson in 1900.

Acrocephalus phragmitis, *Bechstein.* "Sedge-Warbler." Not uncommon by the lake and river, also along the river border of Q.

Accentor modularis, *L.* "Hedge-Sparrow." Common. This has bred in specimen azaleas in conservatory, making use of the ventilators for exit and entrance. Young cuckoos have been found in the nests of this bird.

Acredula rosea, *L.* "Long-tailed Titmouse." This is best seen in winter when flocks of eight or ten may be observed carefully searching the twigs of larches and other trees for the insects on which they feed. A. Q. A flock of 10 birds seen Nov. 20, 1901.

Parus major, *L.* "Great Titmouse." Not infrequent in A. and Q.

P. britannicus, *L.* "Coal-Titmouse." Less numerous than the blue and great titmouse, but not uncommon.

P. palustris, *L.* "Marsh-Titmouse." Seen occasionally.

P. coeruleus, *L.* "Blue Titmouse." The commonest of the tits at Kew.

Sitta caesia, *Wolf.* "Nuthatch." This breeds in Q., and in search of food visits every portion of the gardens. It has bred in a hollow tree in the garden of Dr. A. Günther, and used to visit daily another garden near the Kew Gardens railway station where nuts and other food were placed for it.

Troglodytes parvulus, *K. L. Koch.* "Wren." Not uncommon. A pair build annually and often bring off two broods in the southern wall-like boundary of that part of the rockery dedicated to the cultivation of marsh plants.

Motacilla lugubris, *Temminck.* "Pied Wagtail." A constant resident. Not uncommon. Nests have been built—and young brought off—amongst the bedding plants in the vases of the terrace between the Palm House and the pond. No other species of wagtail has been noted at Kew.

Anthus trivialis, *L.* "Tree-Pipit." An annual visitant, may be heard in two or three places every summer.

Lanius collurio, *L.* "Red-backed Shrike." A few years ago a pair of this species nested and bred near the Palace not far from a hive of bees and destroyed large numbers of the insects.

Muscicapa grisola, *L.* "Spotted Flycatcher." A pair or two in each of the divisions.

Hirundo rustica, *L.* "Swallow." Nests of this species have been built against the rafters of cart-sheds, &c., and also in the large coke-shed in the shaft-yard.

Chelidon urbica, *L.* "Martin." This has nested against buildings in the Gardens out of doors.

Certhia familiaris, *L.* "Tree-Creeper." A constant resident, not uncommon.

Carduelis elegans, *Stephens.* "Goldfinch." Frequently seen in Q., rarely noticed away from that division.

Chrysometris spinus, *L.* "Siskin." In winter small flocks of this pretty little bird may sometimes be seen feeding on the alder trees by the sides of lake, and also along the river bank.

Ligurinus Chloris, *L.* "Greenfinch." Not uncommon. A constant resident. It is difficult sometimes to keep the greenfinch away from various cruciferous plants in the herbaceous collection—it is especially fond of the seeds of radish and those of most of the *Brassicae.*

Coccothraustes vulgaris, *Pallas.* "Hawfinch." A very shy bird and consequently not often seen. On two occasions within the last twenty years dead ones have been picked up in the Arboretum, each time in winter. A pair seen in garden of Keeper of Herbarium, winter 1900–1.

Passer domesticus, *L.* "House-Sparrow." The commonest bird at Kew and the most destructive one. It seems impossible

by destroying nests, &c., to appreciably lessen its numbers. For some of the early spring flowers it appears to have a great liking, the yellow crocus being however much more attacked than the blue or white ones. *Anemone Hepatica* in all its colours has often badly suffered from the ravages of the sparrow. A specimen was seen Nov. 29th, 1901, with half the back a greyish-white colour.

Fringilla coelebs, *L.* "Chaffinch." Very common, but curiously local in the gardens. The remarks under greenfinch are equally applicable to this species.

F. montifringilla, *L.* "Brambling." In some winters large numbers of this bird have been observed feeding on the beech-mast in A. and Q.

Linota cannabina, *L.* "Linnet." This has bred in Q. and has been recently noted there by Dr. A. Günther.

Pyrrhula europaea, *Vieillot.* "Bullfinch." A constant resident. A few pairs are always present within our limits.

Emberiza citrinella, *L.* "Yellowhammer." This has not been observed nesting within our limits; not unfrequent on some of the commons in the neighbourhood.

Sturnus vulgaris, *L.* "Starling." Common, breeding regularly in holes of trees and in roofs of buildings.

Garrulus glandarius, *L.* "Jay." Twenty-five years ago the jay was uncommon at Kew and the magpie quite common. Now, the reverse is the case—the jay breeds regularly and may be heard and seen almost at any time. On March 17th, 1897, I counted a flock of eight near Bamboo Garden.

Pica rustica, *Scopoli.* "Magpie." Formerly common, breeding annually 25 years ago in wood. Now rarely seen; one noted August, 1897.

Corvus monedula, *L.* "Jackdaw." Until within a few years ago several pairs used to breed in large old elms on the "strip" near Brentford Ferry Gate. The damage inflicted on the trees by storms destroyed these breeding places, but the birds continue to build nests and rear their young in holes in tree trunks in Q.

C. corone, *L.* "Carrion Crow." A rather common bird and troublesome on account of the ravages it commits on the eggs and young of the ornamental waterfowl. Breeds in tops of tall elms and other trees in A., P., and Q., in spite of the fact that every effort is made to reduce its numbers.

C. cornix, *L.* "Hooded Crow." A winter visitor, feeding on the garbage left by the tide, and associating with the carrion crow.

C. frugilegus, *L.* "Rook." A regular visitor, does not breed within our limits.

Alauda arvensis, *L.* "Skylark." This probably remains throughout the year in Syon Park and other open places near Kew. It is not uncommon.

PICARIAE.

Cypselus apus, *L.* "Swift." So far as known this does not breed within our limits, but it may be seen any summer day flying in the gardens.

Caprimulgus europaeus, *L.* "Nightjar." During the summer months, the "curious reeling, spinning, or whirring song" may be heard in or about the Queen's Cottage grounds after sunset.

Dendrocopus minor, *L.* "Lesser Spotted Woodpecker." A resident in the Queen's Cottage Grounds where its loud sharp, chirping notes may be heard all the year although the bird itself is exceedingly difficult to see.

Gecinus viridis, *L.* "Green Woodpecker." This breeds regularly in A., between Azalea Garden and Rhododendron Valley, as well as in Q.

Iÿnx torquilla, *L.* "Wryneck." This species breeds in the gardens and has also bred in Dr. Günther's garden in Lichfield Road, between the Victoria Gate and Kew Gardens Railway Station.

Alcedo ispida, *L.* "Kingfisher." One specimen caught in Museum No. 1., Sept. 1898. A frequent visitor to ornamental water near Museum 1. Not unfrequent round lake.

Cuculus canorus, *L.* "Cuckoo." Young cuckoos have been noted in nests of hedge sparrow, whitethroat, throstle and blackbird.

STRIGES.

Strix flammea, *L.* "Barn-Owl." Generally at home in Q. where they breed in old trees; their casts are very frequently found under old ivy clad trees in various parts of the grounds.

Syrnium aluco, *L.* "Tawny Owl." In Queen's Cottage Grounds.

ACCIPITRES.

Accipiter nisus, *L.* "Sparrow-Hawk." Quite a frequent visitor.

Tinnunculus cenchris, *L.* "Kestrel." A casual visitor.

Pandion haliaetus, *L.* "Osprey." Seen by Dr. A. Günther in Oct. 1899. A few days later reported in "Standard" as having been seen in Richmond Park.

HERODIONES.

Ardea cinerea, *L.* "Heron." This does not breed within our limits, but I have seen about a score at one time on trees in Q. and in Old Deer Park. A common visitor to the lake.

ANSERES.

Anas boscas, *L.* "Mallard." Wild visitors have frequently settled and bred on islands in lake and also in Q.

COLUMBAE.

Columba palumbus, *L.* "Wood-Pigeon." Breeds annually in all the divisions. Of late years has become exceedingly tame. In winter flocks of many hundreds come to feed on the acorns and beech mast in A. and Q.

C. œnas, *L.* "Stock-Dove." This breeds in A. near pumping station and also in Q.

Turtur communis, *Selby.* "Turtle-Dove." An unfailing summer visitor to the Queen's Cottage Grounds where its monotonous low crooning note may be heard every day from April to August.

Phasianus colchicus, *L.* "Pheasant." Breeds in Q. Six or eight fully grown birds have frequently been seen at one time.

Perdix cinerea, *Latham.* "Partridge." One or two broods are seen annually—generally in Q.

FULICARIAE.

Rallus aquaticus, *L.* "Water-Rail." On Feb. 21st, 1897, one flew through the window of Museum I, and killed itself by dashing against the glass door of one of the cases—this bird was in all probability being chased at the time by a hawk.

Crex pratensis, *Bechstein.* "Corncrake." The call of this bird may be heard almost any spring day in the meadows of Syon House—opposite the Queen's Cottage Grounds. Much more rarely it has been heard in Q. (May 1901).

Gallinula chloropus, *L.* "Moorhen." A considerable number of broods are hatched annually both in pond and lake. The old moorhens kill many of the young of some of the rarer species of ducks which venture amongst the reeds near their nests.

Fulica atra, *L.* "Coot." Not an uncommon visitor to the lake. Not a permanent resident like the moorhen.

LIMICOLAE.

Tringoïdes hypoleucus, *L.* "Sandpiper." Now and then met with along banks of river within our limits.

Scolopax rusticula, *L.* "Woodcock." A specimen of this bird was caught in Q. 12 years ago.

GAVIAE.

Sterna fluviatilis, *Naumann.* "Common Tern." A tern which is believed to be this species is not unfrequently seen along the Thames within our limits.

Larus argentatus, *J. F. Gmelin.* "Herring-Gull." Of late years large numbers of this gull come regularly up the Thames and many settle on the lake and pond. Indeed some of these wild creatures are tamer than many of the pinioned ones which have been placed on these pieces of water.

Larus canus, *L.* "Common Gull." This is abundant too along the Thames and many settle on the pond near Museum I., where they feed with the other water-fowl.

Larus ridibundus, *L.* "Black-headed Gull." The most abundant species along the Thames. A frequent visitor to the lake and pond. In its winter plumage it is almost impossible to tell this species from the common gull.

PYGOPODES.

Colymbus glacialis, *L.* "Great Northern Diver." Thirty years ago one of these birds was shot on the lake.

Trachybaptes fluviatilis, *Tunstall.* "Little Grebe." This breeds regularly amongst rushes, &c., along the margin of the lake.

Fratercula arctica, *L.* "Puffin." In February, 1891, a bird of the previous year was caught on the side of the Thames by Brentford Ferry Gate; this specimen had probably followed the fortunes of the gulls which now regularly come up the Thames in considerable numbers.

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3. REPTILIA.

LACERTILIA.

Lacerta vivipara. Common lizard.

OPHIDIA.

Tropidonatus natrix, *L.* "The Common Snake." The last specimen seen—one nearly two feet in length—was killed by a workman many years ago.

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4. AMPHIBIA.

URODELA.

SALAMANDROIDEA.

Triton taeniatus, *Schneider.*

T. cristatus, *Laur.* Both this and the preceding are common in and near water in several places within our limits.

ANURA.

ARCIFERA.

Bufo vulgaris, *Laur.* "The Common Toad."

Hyla rubra, *Daud.* Introduced in a Wardian case from Dominica, July, 1898.

Hylodes martinicensis, *Tschudi.* The following account of this species was published in "Nature," October 31st, 1895, p. 643 :—

"A short time ago Mr. W. Watson, the Assistant Curator of Kew Gardens, informed me that he had noticed for several years, in some of the hot-houses, specimens of a small frog, which, hiding away during the day among the pots and orchid baskets, enlivened the quiet evenings with their shrill whistling notes. Suspecting that this frog must be a foreign importation, I asked the Director to allow some of the specimens to be caught, and some days ago I had the pleasure of receiving three specimens in excellent condition.

"The frog is *Hylodes martinicensis*, a small arboreal species, distributed over and common in many West Indian Islands (Martinique, Porto Rico, St. Vincent, Dominica, Barbados, &c., and possibly in Trinidad). Mr. Watson recollects that he observed it first some ten years ago, that he lost sight of it for some time, but that it reappeared about four or five years ago. Taking into consideration the few facts with which we are acquainted as to the reproduction of this frog, it seems most probable that several specimens of both sexes were, on more than one occasion accidentally introduced in Wardian cases.

"However that may be, it is evident that the frogs have freely propagated since their introduction. At present they are most numerous in the propagating houses, in which the temperature ranges between 80 degrees and 100 degrees, sinking in winter at times to nearly 60 degrees. Accompanying Mr. Watson one evening I heard from several points the call of the frogs, which somewhat resembled the piping of a nestling bird ; and, guided by the sound, I had soon the pleasure of seeing one of them clinging to the side of a glass case.

"There is nothing extraordinary in the accidental importation of individuals of a tropical species of frog into Europe, but it is an interesting experience that the species should have permanently established itself. This is owing, in the first place, to the favourable conditions under which it found itself placed, and, secondly, to the peculiar mode of its propagation.

"*Hylodes martinicensis,* and probably the majority of its congeners, does not spawn in water, but deposits from 15 to 30 ova on leaves in damp places. After a fortnight the young frogs are hatched in a perfect form, having passed through the metamorphosis within the egg, thus escaping the vicissitudes and danger to which they would have been exposed during the progress of the usual Batrachian metamorphosis.

"This instance of the acclimatisation in Kew Gardens of the 'Coqui' (as the frog is called in Porto Rico) is unique in Batrachian life at present. I trust that the little guest may long flourish where it has found such a congenial home, and where it usefully aids in the destruction of plant-eating insects and woodlice, of which I found great numbers in the stomach of a specimen. . . ."—Albert Günther.

FIRMISTERNA.

Rana temporaria, *L.* "The Common Frog." Not abundant.

Polypedates quadrilineatus, *Wiegm.* Introduced with living plants from Singapore, 1899. Dr. A. Günther writes concerning this :—" A common species of tree-frog widely dispersed throughout the East Indian Archipelago and Malayan Peninsula. I have never previously seen it alive."

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5. PISCES.

Cottus gobio, *L.* "Miller's Thumb."

Gastrosteus aculeatus, *L.* "Three-spined Stickleback."

G. pungitius, *L.* "Nine-spined Stickleback."

Leuciscus rutilus, *L.* "Roach."

L. phoxinus, *L.* "Minnow."

Tinca tinca, *L. var.* "Golden Tench."

Alturnus alburnus, *L.* "Bleak."

Esox lucius, *L.* "Pike."

Salmo fario, *L.* "Trout."

Anguilla anguilla, *L.* "Eel." A specimen taken from the Palm House pond in the summer of 1902 weighed 6lbs. 2oz. and was 4ft. 5in. long.

With the exception of the tench and trout, the above species are all immigrants from the Thames.

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6. MOLLUSCA.

GASTEROPODA.

Milax Sowerbyi, *Fér.*

Agriolimax agrestis, *L.* "Field Slug."

Limax. maximus, *L.* "Big grey Slug."

Vitrina pellucida, *Müll.*

Vitrea lucida, *Drap.*

V. cellaria, *Müll.*

V. alliaria, *Miller.*

Arion ater, *L.* "Black Slug."

A. hortensis, *Fér.*

Pyramidula rotundata, *Müll.*

Testacella scutulum *Sby.*

T. haliotidea, *Drap.*

Vallonia pulchella, *Müll.*

—— var. **costata**, *Müll.*

Hygromia hispida, *L.*

H. rufescens, *Pennant.*

Helicella cantiana, *Montagu.*

H. itala, *L.*

H. virgata, *Da Costa.*

H. caperata, *Montagu.*

Helicigona arbustorum, *L.*

Helix hortensis, *Müll.* "Garden Snail."

H. nemoralis, *L.* "Wood Snail."

H. aspersa, *Müll.* "Common Snail."

Stenogyra Goodallii, *Miller.* Palm House, March, 1898. A West Indian species.

Cochlicopa lubrica, *Müll.*

Pupa cylindracea, *Da Costa.*

Subulina octona, *Chemn.* Common in the propagating pits where it was first seen in 1884. A widely distributed tropical species.

Limnaea stagnalis, *L.*

L. auricularia, *L.*

L. pereger, *Müll.*

L. palustris, *Müll.*

Physa fontinalis, *L.*

P. acuta, *Drap.* Introduced from Tropical America.

Planorbis corneus, *L.*

P. umbilicus, *Müll.*

P. carinatus, *Müll.*

P. vortex, *L.*

P. contortus, *L.*

P. albus, *L.*

Segmentina nitida, *Müll.*

Neritina fluviatilis, *L.*

Bithynia tentaculata, *L.*

Vivipara contecta, *Millet.*

LAMELLIBRANCHIATA.

Dreissensia polymorpha, *Pallas.*

Anodonta cygnea, *L.* "Freshwater Mussel."

Sphaerium corneum, *L.*

S. lacustre, *Müll.*

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7. ARTHROPODA.

CRUSTACEA.

ENTOMOSTRACA.

By D. J. Scourfield, F.R.M.S.

The following list of the Entomostraca living in Kew Gardens is the result of the examination of a series of collections made at the end of December, 1901, and in January, May, August and October, 1902. It comprises 59 species altogether, distributed among the orders as follows :—Cladocera 27, Branchiura 1, Ostracoda 12, and Copepoda 19. Considering the comparatively small number of collections made, such a list, from the point of view of numbers alone, certainly indicates that the Entomostracan fauna of the gardens is extraordinarily rich for such a limited area. But the list also contains a few species of more than ordinary interest. The chief of these is, perhaps, the blind Harpacticid *Belisarius viguieri*, found in the water collected at the bases of the leaves in Bromeliaceous plants, and in the pitchers of the Pitcher plants. Another noteworthy species is *Pionocypris turgida*, which has no doubt been introduced, probably from Australasia. It is the only example of an exotic Entomostracon found in the gardens. *Canthocamptus bidens* is a species not previously found in this country, while *Simocephalus serrulatus* and *Pleuroxus aduncus*, although found elsewhere before being taken at Kew, have not hitherto been definitely recorded as British. Other rare or little known forms are *Ilyocryptus agilis*, *Alonella exigua*, *Potamocypris fulva*, *Eurytemora lacinulata*, *E. affinis*, and *Cyclops bistriatus*. Nothing of value could be done in regard to any of

the numerous problems awaiting solution in connection with these animals, but the appearance of males and ephippial females of the Cladocera were duly noted and have been referred to under the different species. It would be a very interesting piece of work if at some future time a continuous record, extending over a couple of years or so, could be kept of the variations in the species and individuals inhabiting one or two of the different tanks in the gardens, such as the tank near the Jodrell Laboratory, the *Victoria regia* tank, &c. Such an investigation would undoubtedly throw light on many obscure points relating to the bionomics of these creatures.

PHYLLOPODA.

Cladocera.*

Sida, *Straus.*

S. crystallina, *O.F.M.* Only seen from the lake. Specimens fairly abundant in October.

Diaphanosoma, *Fischer.*

D. brachyurum, *Liévin.* A few specimens only seen (in August) from the pond in front of Museum No. 1.

Daphnia, *O.F.M.*

D. pulex, *De Geer.* Tank near Jodrell Laboratory. Apparently present throughout the year, but in very varying abundance. Plentiful under ice 28th December, 1901, also in January, 1902. Very abundant 31st May, much scarcer 23rd August, and only a few seen 11th October. Males were seen in December and May; ephippial females in December and August. The males were of the typical *pulex* type with one long trailing process from back of abdomen.

D. longispina, *O.F.M.* Two or three specimens (one with ephippium) of a form almost exactly similar to that given by Lilljeborg on Table XIV., Figure 2 of the Clad. Suec., were obtained from the lake on 3rd January. The species has not been met with again.

D. hyalina, *Leydig.* A small form, about $\frac{1}{52}''$ without shell spine, only found in the pond in front of Museum No. I. It occurred in each collection from January to August, but had apparently disappeared in October.

Scapholeberis, *Schoedler.*

S. mucronata, *O.F.M.* Pond in front of Museum No. I., and the lake. All the specimens seen were of the *cornuta* type. They occurred pretty abundantly in the lake in October, several carrying ephippia.

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* W. Lilljeborg's "Cladocera Sueciae," Upsala, 1900, has in the main been followed for the nomenclature of this order.

Simocephalus, *Schoedler.*

S. vetulus, *O.F.M.* A common form recorded from the lake, pond in front of Museum No. I., water-lily pond, tank near Jodrell Laboratory, and the riverside ditch (south of Isleworth Ferry Gate). Ephippial females were observed in May and August.

S. exspinosus, *Koch, ? De Geer.* *Victoria regia* tank, tank in Winter Garden, and the riverside ditch (both north and south of Isleworth Ferry Gate). Not such a common species as the foregoing, but it occurred in considerable numbers in the *Victoria regia* tank in October.

S. serrulatus, *Koch.* Seen only in the lake. Ephippial females obtained in October. This is decidedly a rare British species and it has hitherto only been found in a few localities. Strangely enough the first specimens noticed in this country, so far as I know, were obtained by a friend of mine in 1896 from the riverside ditch somewhere between Kew and Richmond. I have since taken the species in Anglesey and at Richmond Park. It has never previously been placed definitely on record as British, although it has been exhibited at meetings of the Royal Microscopical Society and Quekett Microscopical Club, and duly noticed in the lists of exhibits.

Ceriodaphnia, *Dana.*

C. reticulata, *Jurine.* The lake. Only noticed in October.

C. pulchella, *Sars.* Pond in front of Museum No. I. August. This is the form I have hitherto recorded as *C. quadrangula* (O.F.M.), but it appears from Lilljeborg's monograph that it is really Sars's *C. pulchella*, while on the other hand the species I have recorded as *C. pulchella* should be *C. quadrangula.* The two forms it need hardly be said are extremely closely allied.

Bosmina, *Baird.*

B. longirostris, *O.F.M.* Occurs pretty constantly in the pond in front of Museum No. I. Also seen from the lake. Usually the specimens were nearly typical *longirostris*, but in the pond on 31st May some were approaching the *cornuta* type, and on 23rd August all were of this variety.

Ilyocryptus, *Sars.*

I. agilis, *Kurz.* *Salvinia* tank in water-lily house. I first recorded this rare species in this country from the *Victoria regia* tank at the Royal Botanic Gardens, Regent's Park, in 1894 (Journ. Quekett Micro. Club, ser. 2, vol. 5, pp. 429–432). Since then I have found it three times in the open, namely, in Rollesby and Barton Broads, Norfolk, 1898, and in the Basingstoke Canal near Weybridge, 1899.

Eurycercus, *Baird.*

E. lamellatus *O.F.M.* The lake and the water-lily pond.

Acroperus, *Baird.*

A. harpae, *Baird.* The lake, pond in front of Museum No. I., water-lily pond, and the riverside ditch.

Alona, *Baird* (= **Lynceus**, *Lillj.*).

A. affinis, *Leydig.* Pond in front of Museum No. I.

A. guttata, *Sars.* The lake.

A. rectangula, *Sars.* The lake and pond in front of Museum No. I.

Graptoleberis, *Sars.*

G. testudinaria, *Fischer.* The lake, water-lily pond, and tank near Jodrell Laboratory.

Alonella, *Sars.*

A. exigua, *Lilljeborg.* Water-lily pond. Although *A. exigua* was recorded as British by Norman and Brady in 1867, it is just possible that they did not really have this species but only the commoner *A. excisa*, and as no one else seems to have recorded it (Mr. T. Scott definitely states that all the forms referred to by him as *A. exigua* were actually *A. excisa*), the present may be the first definite record of the species in this country.

A. rostrata, *Koch.* Pond in front of Museum No. I.

Pleuroxus, *Baird.*

P. laevis, *Sars.* Pond in front of Museum No. I., and tank near Jodrell Laboratory.

P. trigonellus, *O.F.M.* Riverside ditch (north of Isleworth Ferry Gate).

P. uncinatus, *Baird.* Pond in front of Museum No. I.

P. aduncus, *Jurine.* The lake and the riverside ditch. Although this is a fairly common British species, it does not seem to have been previously recorded under this name, having been included by all writers on our native Entomostraca, so far as I am aware, under *P. trigonellus.*

Chydorus, *Leach.*

C. globosus, *Baird.* Pond in front of Museum No. I., and the riverside ditch (south of Isleworth Ferry Gate). A male was seen in January from the first-named locality.

C. sphaericus, *O.F.M.* Found in nearly every locality examined, including the cups formed by the leaves of Bromeliaceous plants. Ephippial females were seen at end of May in one of the tanks in the winter garden.

Branchiura.

Argulus, *O.F.M.*

A. foliaceus, *Linn.* This well-known fish parasite was found in the lake by Mr. C. F. Rousselet.

Ostracoda.*

Cypria, *Zenker.*

C. ophthalmica, *Jurine.* The lake, pond in front of Museum No. I., and tank near Jodrell Laboratory.

Cyclocypris, *Brady and Norman.*

C. serena, *Koch.* Riverside ditch.

Cypris, *O.F.M.*

C. incongruens, *Ramdohr.* Only seen from one of the corner tanks in the water-lily house.

C. obliqua, *Brady.* *Victoria regia* tank, and one or two of the corner tanks in the water-lily house.

Herpetocypris, *Brady and Norman.*

H. reptans, *Baird.* Riverside ditch (south of Isleworth Ferry Gate).

Pionocypris, *Brady and Norman.*

P. vidua, *O.F.M.* The lake, one of the corner tanks in water-lily house, tank near Jodrell Laboratory, and the riverside ditch.

P. turgida, *Sars.* *Victoria regia* tank, and *Azolla* tank in water-lily house. This species, described as *Cypridopsis turgida* by G. O. Sars in 1894, has only been found hitherto in New Zealand and Australia. It is the only unequivocal case of an exotic Entomostracon known to be living in Kew Gardens.

Potamocypris, *Brady.*

P. fulva, *Brady.* This rather rare British species was seen on one occasion only in the lake.

Notodromas, *Lilljeborg.*

N. monacha, *O.F.M.* Riverside ditch (south of Isleworth Ferry Gate).

Ilyocypris, *Brady and Norman.*

I. biplicata, *Koch* (= *I. bradii*, Sars). Tank near Jodrell Laboratory.

Candona, *Baird.*

C. pubescens, *Koch.* Riverside ditch (south of Isleworth Ferry Gate).

C. fabaeformis, *Fischer.* Corner tanks in water lily house.

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* Brady and Norman's "Monograph of the Marine and Freshwater Ostracoda of the N. Atlantic and N. W. Europe," 1889 and 1896, has been followed as far as possible for this Order.

Copepoda.*

Diaptomus, *Westwood.*

D. gracilis, *Sars.* The lake, and pond in front of Museum No. I.

Eurytemora, *Giesbrecht.*

E. lacinulata, *Fischer.* The lake; only seen on one occasion.

E. affinis, *Poppe.* Riverside ditch (north of Isleworth Ferry Gate). This species is only found as a rule in brackish water or in water having occasional connection with brackish water. Its occurrence in the riverside ditch is therefore probably due to the occasional influx of Thames water.

Cyclops, *O.F.M.*

C. strenuus, *Fischer.* The lake, pond in front of Museum No. I., one of the corner tanks in water-lily house, and tank near Jodrell Laboratory. The form occurring in the pond just referred to was always of the ***vicinus*** type.

C. leuckarti, *Claus.* Seen only in the lake.

C. oithonoides, *Sars.* *Victoria regia* tank, central and one or two of the corner tanks in the water-lily house.

C. viridis, *Jurine.* The *gigas* form occurred in the lake, water-lily pond, tank near Jodrell Laboratory, and the riverside ditch. The *brevicornis* form was found in the lake, pond in front of Museum No. I., and in the central tank in the water-lily house.

C. bicolor, *Sars.* Water-lily pond and riverside ditch (south of Isleworth Ferry Gate).

C. fuscus, *Jurine.* Tank near Jodrell Laboratory and riverside ditch (south of Isleworth Ferry Gate).

C. albidus, *Jurine.* A common species occurring in the majority of the collections made.

C. bistriatus, *Koch* (= *C. distinctus*, Richard). Riverside ditch (south of Isleworth Ferry Gate). This is the peculiar form, a possible hybrid between *C. fuscus* and *C. albidus*, first recorded by me as British in "The Entomostraca of Epping Forest"—(Essex Naturalist, 1898, p. 325).

C. serrulatus, *Fischer.* A common species found in most of the collections except those from the indoor warm water tanks. So far as was observed, only the *varius* and *macruroides* types of Lilljeborg† occur, the former being much the commoner.

C. prasinus, *Jurine.* The tank near the Jodrell Laboratory is the only place where this rather rare species has been seen.

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* O. Schmeil's "Deutschlands freilebende Süsswasser-Copepoden" 1892–1897, followed as far as possible for this Order.

† "Synopsis specierum . . . . Cyclopis," 1901.

Canthocamptus.

C. staphylinus, *Jurine.* The lake and the water-lily pond.

C. minutus, *Claus.* Only obtained from the lake; on one occasion by washing damp moss from near the water's edge.

C. trispinosus, *Brady.* Tank near Jodrell Laboratory and the riverside ditch.

C. bidens, *Schmeil.* A single specimen only, from the water-lily pond. It appeared to agree in every particular with Schmeil's *C. bidens* except that the inner rami of the first feet were three-jointed instead of two. This is certainly a difference of some importance, according to the accepted ideas as to the value of the structure of the feet for specific determination, but it seems impossible to place this single character against all the others. This is a new record for the British fauna.

Nitocra, *Boeck.*

N. hibernica, *Brady.* Pond in front of Museum No. I.

Belisarius, *Maupas.*

B. viguieri, *Maupas.* Found in the water collected by the cup-like bases of the leaves of various Bromeliaceous plants, and in the pitchers of Pitcher plants. I first found this remarkable species in this country at the Royal Botanic Gardens, Regents Park, in 1898, living in the cups formed by the leaves of Bromeliaceous plants. Since then I have had it repeatedly from the same place, but it has not hitherto been recorded as occurring in the British Isles. Maupas, when first describing *B. viguieri* ("Sur le Belisarius Viguieri," &c., Comptes Rendus cxv., 1892, pp. 135–7) unfortunately did not give a figure of it, but from what he states there seems no reasonable doubt that the form occurring at Kew and at Regent's Park is the same species. Mrázek described the same form under the name of *Phyllognathopus paludosus* ("Beitrag zur Kenntniss der Harpacticiden-fauna des Süsswassers"—Zool. Jahrbücher, Syst. Abt., vol. vii., 1893). I have carefully compared my specimens with his figures and description, and find that they agree in nearly every detail except that the tail furca and setae of the adult female are more specialised than shown by Mrázek. W. Hartwig, who records this species from Prussia ("Die Krebsthiere der Provinz Brandenburg." Naturwissenschaftliche Wochenschrift, Band xi., 1896, p. 320) also noticed a difference in the furca of his specimen as compared with Mrázek's figure, but his account of the structure does not agree with what I find in my specimens. A possible explanation of these differences in a single character may be that both Mrázek and Hartwig had examples in different stages of development, neither being quite adult.

MALACOSTRACA.

Asellus aquaticus, *L.* Lake.

Oniscus asellus, *L.* "Woodlouse."

Trichoniscus roseus. Rockery.

Armadillo vulgaris, *L.*

Porcellio scaber, *Latr.*

Philoscia muscorum, *Scop.*

ANTENNATA.

By R. I. Pocock, F.Z.S.

MYRIAPODA.

CHILOPODA (Centipedes).

Lithobius forficatus, *L.* In all the divisions. "Common everywhere throughout Europe."

Cryptops hortensis, *Leach.* Herbaceous ground "Common throughout temperate Europe."

C. anomolans, *Newp.* Among grass roots close to wall of Old Palace, December, 1898. Also in frame ground, Herbaceous department. "This species belongs typically to the fauna of the Mediterranean area and has hitherto not been met with elsewhere in Great Britain, nor so far north as London in any country of Europe."

Scolopendra morsicans, *L.* Introduced amongst living plants from India.

S. subspinipes, *Leach.* Introduced from the Tropics.

Geophilus flavus, *De Geer* (G. longicornis, *Leach*). "Common throughout Europe."

G. electricus, *L.* "A European species but not common in England."

G. sp. In rotten wood at south end of Herbaceous ground. "Apparently not identifiable with any British species."

Mecistocephalus punctifrons, *Newp.* "Imported probably from India."

Stigmatogaster subterraneus, *Leach.* Amongst old stumps end of Herbaceous ground. "A common British species."

DIPLOPODA (Millipedes).

Polydesmus complanatus, *L.* Common in cool plant houses and elsewhere.

Brachydesmus superus, *Latzel.* "Common in the south of England and in central Europe."

Orthomorpha coarctata, *Sauss.* Arboretum.

O. gracilis, *Koch.* "This species and the preceding are world wide in their distribution owing to artifical importation."

O. Kelaarti, *Humb.* Imported amongst living plants from Ceylon.

Iulus teutonicus, *Poc.* Rockery, Herbaceous ground, &c. "Common in the south of England and Western Europe."

I. punctatus, *Leach.* Herbaceous ground. "A common European species."

Blaniulus guttulatus, *Bosc.* Frequent in all the divisions. A common European species.

Typhloiulus sp.? Amongst rotten stumps south end of Herbaceous ground.

Trigoniulus Goësi, *Porat.* "Distributed all over the world by human agency."

Rhinocricus monilicornis, *Porat.* Imported from Barbados amongst living plants. "Known also from Demerara, Hayti and Bermuda."

R. Vincenti, *Poc.* Introduced in October, 1900, amongst living plants from St. Vincent, West Indies. "First record of the species in Britain."

Spirobolellus sp.? In stoves. "Probably imported from the Oriental region."

INSECTA.

ORTHOPTERA.

By W. J. Lucas, B.A., F.E.S.

Of about thirty-nine species of the Order Orthoptera that may be looked upon as British—*i.e.*, that breed in this country—seven only have so far been recorded from Kew, and some of these, even, appear to have been introduced casually. They are three Earwigs—*Anisolabis annulipes*, Lucas; *Labia minor*, Linn.; *Forficula auricularia*, Linn.; and four Cockroaches—*Phyllodromia germanica*, Linn.; *Blatta orientalis*, Linn.; *B. americana*, Linn.; and *B. australasiae*, Fabr. On the other hand, from time to time various Orthopterous insects, which can in no way be considered British, have been found, generally in packages containing plants from abroad. Such introductions are of course to be expected.

Of British species not yet found, search during a season or two would no doubt bring to light most of the following as denizens of Kew:—*Apterygida arachidis*, Yers. (in houses); *Ectobia lapponica*, Linn.; *Stenobothrus lineatus*, Panz.; *S. viridulus*, Linn.; *S. bicolor*, Charp.; *S. parallelus*, Zett.; *Gomphocerus maculatus*, Thunb.; *Tettix bipunctatus*, Linn.; *Leptophyes punctatissima*, Bosc. (on bushes); *Meconema varium*, Fabr. (on oak,

1. Blatta australasiæ, *Fabr.*, nat. size.
2. Blatta americana, *L.*, nat. size.
3. Chelisoches morio, *Fabr.* ♀ (× 3).
4. Chelisoches morio. ♂ (× 3).
5. Anisolabis annulipes. *Luc.* ♀ (× 3).
5a. Anisolabis annulipes, antenna.

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lime, &c.); *Gryllus domesticus*, Linn. (in houses); and *Gryllotalpa gryllotalpa*, Linn. Less likely, but still possible, are :—*Forficula lesnei*, Finot; *Apterygida albipennis*, Meg. (on flowers); *Ectobia livida*, Fabr.; *Stenobothrus rufipes*, Zett.; *S. elegans*, Charp.; *Gomphocerus rufus*, Linn.; *Locusta viridissima*, Linn.; *Thamnotrizon cinereus*, Linn.; *Platycleis grisea*, Fabr.; *P. brachyptera*, Linn.; and *Gryllus campestris*, Linn. Details of records follow :—

1. **Anisolabis annulipes,** *Lucas*. Two specimens from Ootacamund, in Madras Presidency, India, in the rubbish that was packed with plants, many of them orchids that were sent to the Gardens, April, 1897. The insects were alive when I received them.—One specimen which came to Kew in sugar-cane from Mauritius, August, 1894.—An immature female found in a case received from Penang about 26th October, 1898. One Indian specimen and the specimen from Mauritius were small, while that from Penang was immature, and they are named therefore with a little diffidence, though there is practically no doubt about their identity. In Britain the species has been found in two or three places, but does not live out of doors. It is a somewhat southern insect. The female was figured in the "Entomologist," vol. xxx., p. 125. (Fig. 5, ×3; fig. 5a, antenna.)

2. **Labia minor,** *Linn*. Three specimens, two male and one female, taken from soil heap in Arboretum Pits, 14th April, 1897. It is a pretty common British species, which readily takes to the wing, and is usually found around manure-heaps.

3. **Forficula auricularia,** *Linn*. The common earwig, only too abundant everywhere. It is by nature an animal feeder. Does it do as much damage as is supposed?

4. **Chelisoches morio,** *Fabr*. Two, a male and a female, arrived in sugar-cane from Mauritius in August, 1894. This species had not previously been noticed in Britain. They were figured in the "Entomologist," vol. xxxi., pl. I., p. 49. (Fig. 3, ♀ ×3; fig. 4, ♂ ×3.)

5. **Phyllodromia germanica,** *Linn*. An immature specimen (no doubt this species) from Ootacamund, on living plants, April, 1897. This species is now established in Britain.

6. **Ischnoptera sp.** A single specimen found in a Wardian case received from Mr. J. McClounie, of the Scientific Department, Zomba, British Central Africa. The genus is a large one and the species are not clearly defined.

7. **Blatta orientalis,** *Linn*. Three female specimens from buildings, 1897. No other specimens have been sent me at any time, so I conclude the species is not established in the gardens.

8. **Blatta americana,** *Linn*. A large specimen found in the tropical propagating pits, April, 1897.—One mature and three immature specimens found alive in a case received 18th October, 1898, from the Belgian Congo State. Four fine specimens found in a case of plants from Singapore, June, 1899, and two mature specimens in a package from Burma, March, 1900. This species, which has established itself at the Zoological Gardens in Regent's Park, and elsewhere, does not seem to have done so at Kew. (Fig. 2)

9. **Blatta australasiae,** *Fabr.* Unlike the last, this immigrant cockroach is well established in the gardens, and, being apparently not so much of a scavenger as most cockroaches, does much damage to the plants. Apart from those bred on the spot, a number have arrived in cases from abroad.—An immature specimen found on living plants from Ootacamund in India, 3rd April, 1897.—Two in a box from Dominica, about April, 1897.—An immature specimen received July, 1898, in a case from Buitenzorg, Java.—An immature specimen received April, 1901, in a Wardian case from Calcutta.—One immature amongst *Catasetum longifolium* from Demerara, about April, 1897.—One mature from pit 17A about April, 1897. Was this an introduced specimen ?—One mature and two immature received 18th October, 1898, in a case from the Belgian Congo State.—An immature specimen, probably of this species, received in a Wardian case from Calcutta, April, 1901. (Fig. 1.)

10. **Nauphœta cinerea,** *Oliv.* Four large specimens—brown in colour, their tegmina sprinkled with white dots—found 18th October, 1898, in a case from the Belgian Congo State.

11. **Nauphœta circumvagans,** *Burm.* One received in a Wardian case from Calcutta, April, 1901. Colour resembles that of the preceding species.

12. **Leucophaea surinamensis,** *Linn.* Two specimens, one mature and one immature, taken in the tropical propagating pits, April, 1897.—An immature specimen found in cocoa-nut fibre in one of the tropical houses.—An immature specimen received April, 1901, in a Wardian case from Calcutta. Immature specimens cannot always be identified with absolute certainty, but there appears to be no doubt in these cases. The conditions under which these insects were found make it possible that they may have been bred at Kew.

13. **Copiophora brevirostris,** *Stål.* A full-grown specimen found on the underside of the leaf of an aroid. The plant had no name, but was recognised as '408/93 Curtis, Malaya.' It is a large brilliant green grasshopper, with ovipositor of inordinate length. Mr. Burr tells me that in the typical *brevirostris* the last tarsal joint is black ; but the specimen probably belongs to the species named. Its home may be the northern part of South America, probably Columbia.

14. **Gryllacris sp.** A specimen found on *Nepenthes* in propagating pits, 6th October, 1897. Being immature the species remains undetermined.

15. **Homœogryllus reticulatus,** *Fabr.* A female found on 18th October, 1898, in a case from the Belgian Congo State. The species varies considerably in wing-length, and colour and breadth of elytra.

16. **Gryllodes sp.** One received in a Wardian case from Calcutta, April, 1901. Both sexes are necessary to determine the species satisfactorily.

I have to thank Mr. Malcolm Burr for assisting me with the identification of some of the specimens.

NEUROPTERA.

By W. J. Lucas, B.A., F.E.S.

In Britain we have between 360 and 370 members of the heterogeneous group of insects that are usually put together as constituting the natural order *Neuroptera*—a group of insects containing a number of divisions which must ultimately be separated into several independent natural orders. Some hundred perhaps of these insects we might expect at Kew, but so far the list —eight species—is a meagre one indeed. They are :—Five dragon flies—*Æschna cyanea*, Müll ; *Æ. grandis*, Linn. ; *Pyrrhosoma nymphula*, Sulz. ; *Ischnura elegans*, Lind. ♂ ; *Agrion pulchellum*, Lind. ♀ (?) ; *A. puella*, Linn. ; *Enallagma cyathigerum*, Charp ; and one scorpion fly—*Panorpa germanica*, Linn. ♀, taken in Queen's Cottage Grounds, 10th June, 1902.

COLEOPTERA.

By H. H. W. Pearson, M.A., F.L.S.

Adephaga.

Carabus violaceus, *L.*

Notiophilus biguttatus, *F.*

Leistus fulvibarbis, *Dej.*

Clivina fossor, *L.*

Harpalus aeneus, *F.*

Pterostichus madidus, *F.*

Amara communis, *Panz.*

Dytiscus marginalis, *L.*

Staphylinidae.

Tachyporus hypnorum, *F.*

Leistotrophus nebulosus, *Pertz.*

Ocyphus compressus, *Marsh.* Queen's Cottage Grounds.

Philonthus discoideus, *Grav.*

Xantholinus fulgidus, *F.* Hippeastrum Pits.

X. punctulatus, *Payk.*

X. longiventris, *Heer.*

Baptolinus alternans, *Grav.*

Othius fulvipennis, *F.* Queen's Cottage Grounds.

Platystephus arenarius, *Fourc.*

Oxytelus sculptus, *Grav.*

Trogophloeus Crichsoni, *Sharp.*

Lathrimaeum unicolor, *Steph.*

Phloeobium sp. The specimen was found among seeds received from Matabeleland and appears to be a new species.

Clavicornia.

Choleva Watsoni, *Spence*. Queen's Cottage Grounds.

Coccinella decempunctata, *L.* "Ladybird."

C. undecimpunctata, *L.* "Ladybird."

Chilocorus bipustulatus, *L.*

Cartodere sp. Found among dried specimens of Chinese plants. Species of this genus are destructive to dried herbarium specimens.

Byturus tomentosus, *F.* On hawthorn.

Lamellicornia.

Lucanus cervus, *L.* "Stag beetle."

Geotrupes stercorarius, *L.*

Rhizotrogus solstitialis, *L.* "Small Cockchafer."

Melolontha vulgaris, *F.* "Large Cockchafer."

Serricornia.

Agriotes sputator, *L.* "Wire-worm."

Telephorus lividus, *L.*

Cis Boleti, *Scop.*

Longicornia.

Prionus coriarius, *L.*

Diaxenes dendrobii, *Grah.* Found in 1898 in bulbs of *Laelia albida* imported from Mexico by Messrs. Sander in 1896.—(*See* McDougall in Gard. Chron., 1897, p. 48.)

Phytophaga.

Phaedon cochleariae, *F.*

Podagrica fuscipes, *L.* On mallows.

Cassida viridis, *F.*

Heteromera.

Scaphidema metallicum, *F.* Queen's Cottage Grounds.

Tenebrio guineense, *Imhoff.* Imported from Sierra Leone.

Helops striatus, *Fourc.* Queen's Cottage Grounds.

Rhinosimus planirostris, *F.*

Anaspis maculata, *Fourc.* On hawthorn.

RHYNCHOPHORA.

Araeocerus fasciculatus, *De Geer.* With a dried plant from Szemao. Also said to attack coffee and cacao. (*See* Lucas in "Ann. Soc. Ent. France," 1861, 399.)

Rhynchites aequatus, *L.* On hawthorn.

Phyllobius pyri, *L.* On hawthorn.

P. maculicornis, *Germ.* On hawthorn.

Sitones lineatus, *L.* "Pea-weevil."

Xyleborus morigerus, *Blandford.* "Dendrobium beetle." (*See* Gard. Chron. [3], xxiv. (1898), p. 388, fig. 112.)

HYMENOPTERA.

FORMICIDAE. (Ants.)

By Lt.-Col. C. T. Bingham.

Ants as a class greatly affect plants, either for food or shelter. Many species are truly arboreal, making their nests among the leaves of trees or in hollows in the trunk or branches. Others again are miners, and for preference make their nests in the earth among the roots of plants. All species, both vegetarians and carnivores. wander more or less over trees and plants in their search for food. It is not therefore surprising that numerous species have been transported from their natural habitat with living plants and are to be found in the plant houses and conservatories of botanical gardens all over the world. Dr. A. Forel, the eminent myrmecologist, has published one such list of ants as an appendix to his paper on the ants contained in the Natural History Museum, Hamburg ("Mittheilungen aus dem Naturhistorischen Museum," xviii., 1901, pp. 78–82).

From time to time lately a few ants have been forwarded for identification to the Natural History Museum, South Kensington, from the Botanic Gardens, Kew. A list of these, with particulars of the plants on which or localities where they were found, is appended. The number so far has been small, but all the subfamilies of the *Formicidae*, with the exception of the *Dorylinae*, are represented.

Ponerinæ.

Diacamma vagans, *Smith, Journ. Linn. Soc. Zool.*, iv. (1860), *suppl.*, p. 103. "Received in Ward's case from Calcutta, June, 1898." Found in various parts of India, Burma, and Ceylon, ranging into the Malayan subregion. Common round Calcutta. Identified by Mr. W. F. Kirby.

Myrmecinæ.

Myrmica ruginodis, *Nyl., Acta, Soc. Sc. Fennic.*, ii. (1846), p. 929 ☿ ♀ ♂, pl. 18, figs. 5 and 30. "In little piece of rotten wood in Queen's Cottage, May, 1902." Distributed through Europe, parts of Asia, and North America. A common British species.

Monomorium pharaonis, *Linn., Syst. Nat. Ed. 10th*, i., 1758, p. 580. "Taken from flowers of *Cereus* sent from greenhouse No. V. to Herbarium." A ubiquitous species spread through the warm as well as the temperate regions of the globe.

Cremastogaster scutellaris, *Oliv., Encycl. Méthod. Ins.* vi., 1791, p. 497. "Among virgin cork." Common in South Europe. Specimens sent were remarkably fine and robust.

Triglyphothrix obesa st. striatideus, *Emery, Ann. Mus. Civ. Gen.* xxvii. (1889), p. 501. "In propagating pits." Widespread. Recorded from Tunis, Sierra Leone, Ceylon, and Burma.

Atta sp. "Found in pseudobulbs of orchids from Trinidad (propagating pits)." These ants were sent to the museum in May, 1897, and were declared to be "driver ants!" The true driver ant occurs in Africa, is carnivorous, and belongs to the *Dorylinæ*. From the fact that in the letter from Dr. Günther to Mr. Nicholson the ants were said to strip trees of their leaves, I suspect the species sent was really an *Atta*.

Dolichoderinæ.

Dolichoderus sp. "Taken from flowers of *Cereus* sent from greenhouse No. V. to Herbarium." The specimens were received in fragments, and it was impossible to make out the species.

Technomyrmex albipes, *Smith, Journ. Linn. Soc.*, vi. (1861), p. 38. "Palm house." Found in the Indo-Malayan region, but introduced into many parts of the world.

Camponotinæ.

Lasius niger, st. brunneus, *Latr., Ess. Hist. Fourmis France*, 1798, p. 41. "On young dead sparrow near Herbarium." Distributed through Europe, northern Asia, and North America. A common British species.

L. niger, st. alienus, *Först., Hym. Stud.*, i., 1850, pp. 36 and 71. "From two colonies in grass. Herbarium grounds." Distributed through Europe, northern and central Asia, and North America. A common British species.

L. flavus, *Fabr., Spec. Ins.*, i., 1781, p. 491. "Among grass roots at foot of wall of House No. 1." Distributed through Europe, northern Asia, and North America. A common British species.

Prenolepis nitens, *Mayr, Verh. zool. bot. ver. Wien*, ii. (1852), p. 144. "Tropical fern house." Europe to Eastern Asia. Very rare and introduced in England.

P. longicornis, *Latr., Hist. Nat. Fourmis*, 1802, p. 113. "Propagating pits." Variety with antennæ somewhat shorter

than in typical specimens. Introduced into many parts of the world. Common all over India. Has been recorded from London, Exeter, Hastings, and Cambridge.

HEMIPTERA.

COCCIDAE. (Scale-insects.)

By R. Newstead, A.L.S., &c.

The following enumeration of 24 genera and 45 species represents about one half of all the species which have been found within the British Isles, and far surpasses any other record for an equal area.

Of the 45 recorded species, 11 may be considered indigenous; and the remaining 34, found under glass, are exotics, and have been introduced on imported plants. Of the latter, 14 have not been found elsewhere in the British Isles; and *Fiorinia kewensis*, Newst., and *Ripersia filicicola*, Newst., have not, so far as is at present known, been met with in any other part of the world.

It is important to note that four of the introduced species, viz.:—*Aspidiotus spinosus*, Comst., *Ripersia filicicola*, Newst., *Icerya ægyptiacum*, Doug., and *Gymnococcus agavium*, Doug., have been entirely destroyed; in the first instance chiefly by parisitic fungi, and in the three latter by careful attention and the application of insecticides. On the other hand several destructive species are apparently on the increase and difficult to check by means of insecticides or by ordinary fumigation methods.

The work of collecting the coccids has been carried on chiefly by Mr. Nicholson, F.L.S., who has discovered several interesting species, and two that are new to science. Mr. E. E. Green, F.E.S., Government Entomologist of Ceylon, and Mr. R. Newstead, Curator of the Grosvenor Museum, Chester, have, through the kindness of the Director, visited the Royal Gardens and made several collections of the Coccidæ. The results of their researches will be found in the volumes of the Entomologist's Monthly Magazine. Mr. J. W. Douglas has also dealt with several important species in the same publication.

Explanation of the signs used :—

* Species found living under glass.

† Species not known to occur elsewhere in the British Isles.

‡ Species not known to occur outside the British Isles.

§ Indigenous species.

Diaspinæ.

Aspidiotus, *Bouché.*

*†**A. ficus**, *Riley.* (All stages.) On *Garcinia Cambogia*; *Lonchocarpus Barteri*, Benth.; *Eugenia malaccensis*; *E. polypetala*, and *Plumeria incarnata.* This species is one of the

largest and most destructive members of the genus, but does not appear to increase very rapidly at Kew, although several broods are apparently produced in a year.

*†**A. personatus,** *Comstock.* (Females only.) On *Tillandsia spp.* The minute thimble-shaped puparium of this species readily distinguished it from any of its allies. It is a neotropical species, and is very common in the West Indies.

*†**A. perseae,** *Comst.* (Females only.) On *Anthurium sp.* First recorded from Kew in 1889; but has not since been met with in any part of the British Isles.

*†**A. spinosus,** *Comst.* (Females only.) Previously recorded in error by Newstead as *A. cydoniæ* (Ent. Mo. Mag., 1897, p. 74). Occurred in great numbers on the huge dead leaf-stalks of the magnificent and long established specimen of *Arenga saccharifera* from the Malay Archipelago.

§**A. britannicus,** *Newstead.* (Females and male puparia.) On *Ruscus Hypoglossum*; *Ilex Aquifolium*, var. *kewense*; and on ivy and box. Very abundant, and undoubtedly on the increase, and may in time prove a destructive species.

***A. hederae.** (Females and male puparia.) A general feeder. Previously recorded under the names *A. nerii*, Bouché, and *A. alöes*, Boisduval. A widely distributed and injurious species.

***A. cyanophylli,** *Signoret.* (Females only.) Found in small numbers on *Miconia magnifica.*

***A. dictyospermi,** var. **arecae,** *Newst.* (Females only.) Sparingly in the Palm House on young palms.

Gymnaspis, *Newst.*

*†**G. aechmeae,** *Newst.* (All stages but the perfect male.) On *Aechmea aquilega.* This species bears a striking superficial resemblance to *Aspidiotus personatus*, but the puparium which is much more shiny, is formed entirely of the moulted skin of the second stage female. Its only other known habitat is Rio de Janeiro, where it has recently been found on cultivated plants. It was common at Kew when first discovered in 1898.

Fiorinia, *Targioni-Tozzetti.*

*‡**F. kewensis,** *Newst.* (Females and male puparia.) Abundant on *Howea forsteriana* in the Temperate House. Discovered by Mr. G. Nicholson in March, 1898. The species is remarkable for the dense white felted covering of the puparium.

Parlatoria, *Targ. Tozz.*

***P. pergandii** var. **Crotonis,** *Douglas.* (Females and male puparia.) Very common on various members of the croton family.

Diaspis, *Costa.*

***D. Boisduvalii,** *Sign.* (All stages but perfect male.) On *Cocos romanzoffiana*, *Heliconia metallica*, *Nannorrhops ritchieana*,

Aechmea mexicana, *Pitcairnia bromeliaefolia*, *P. latifolia*, *P. alta*, *Bactris acanthocarpa*, and *Euterpe speciosa*. A pernicious species, found almost everywhere on cultivated plants, and is often very destructive to young pot palms.

†§**D. carueli.** (Females and male puparia.) Infesting and almost covering the branches of *Juniperus virginiana*. "The shrub was raised at Kew in 1891, but whether from seeds or cuttings is not known. It is from variety *horizontalis*—an old collection plant, and is probably from cuttings." (Nicholson, in lit., March, 1898.

D. calyptroides, *Costa*. Common in the succulent house.

Aulacaspis (*Diaspis*), *Cockerell*.

§**A. rosæ,** *Bouché*. (Females and male puparia). Abundant on *Rosa spp.* in the open air. This is the common "scurfy-scale" of the rose, both cultivated and wild.

†**A. pentagona,** *Targ. Tozz.* (Females and male puparia.) Hab. on *Prunus Pseudo-cerasus* freshly imported from Japan. About one hundred plants were found infected and advisedly destroyed. It is a pest in many parts of the world, and is very destructive to the mulberry in Southern Europe.

Poliaspis, *Maskell*.

*†**P. cycadis,** *Comst.* (Female and male puparia.) Very sparingly on *Cycas revoluta*, *C. media*, *C. celebica*, *Zamia muricata*, and *Z. Loddigesii*.

Chionaspis, *Signoret*.

§**C. salicis,** *Linn*. (Females and male puparia.) Common on ash (*Fraxinus excelsior*) and on *Syringa vulgaris*. It is a general feeder, but is most commonly met with on ash, willow and alder (*Alnus glutinosa*).

***C. aspidistrae,** *Sign*. (Females and male puparia.) On *Cocos plumosa*, *Heliconia metallica*, *Polypodium aureum*, and *Cordyline australis*. In this country the species is decidedly partial to ferns.

*†**C. biclavis,** *Comst*. (Females only.) On *Anona muricata*. First recorded by Mr. A. C. F. Morgan, F.L.S. (Ent. Mo. Mag. s.s. vol. iii., p. 15), and not since met with. This species has the remarkable power of burrowing under the bark of its food plants, or under the epidermal layer of hairs, woolly filaments or scales, &c., completely burying itself and its puparium.

Mytilaspis, *Sign*.

§**M. pomorum,** *Bouché*. (Females only.) Common on *Ribes sanguineum*, *R. prostratum*, *Ceanothus papillosus*, *Cornus alba* var. *Spaethii*, *C. sanguinea*, *Eleagnus argentea*, *Cotoneaster bacilaris*, *Salix sp.* (Hybrid alpine willow). This is the species known to horticulturists as the "Mussel Scale." It is a very general feeder, but is partial to the cultivated apple and cotoneaster. The females are for the most part parthenogenetic; the males having been

discovered but twice since the time of Linneus, although close attention has been given to the species by students in various parts of the world.

*†**M. pinnæformis,** *Bouché.* (Females only.) First recorded from Kew, on *Cymbidium pendulum*, by Mr. Douglas (Ent. Mo. Mag., vol. xxiv., p. 21. Not since met with in the British Isles.

Pinnaspis, *Cockerell.*

***P. buxi,** *Bouché.* (Females only.) Recorded also as *P. pandani* and *Mytilaspis buxi*, which are synonyms. Occurs abundantly on *Licuala grandis*, *Daemonorops lewisianus* and *Chrysalidocarpus lutescens.* A form having a white puparium, which agrees with Cockerell's var. *albus*, occurred in great numbers on the last-named plant.

Ischnaspis, *Douglas.*

***I. filiformis,** *Doug.* (Females and male puparia.) Common on *Diospyrus discolor.* Remarkable for the long narrow form of the puparia, which look like little bits of black thread.

Lecaniinae.

Lecanium, *Illiger.*

***L. hesperidum,** *Linn.* (Females only.) On *Rondeletia amoena*, *Meryta Denhamii*, *Mangifera indica*, *Schinus terebinthifolia*, *Nephrodium villosum*, *Bertolonia sp.*, *Lucuma multiflora*, *Dalbergia lanceolaria*, and in the open air on *Hedera sp.*, &c. This is a widely distributed and common greenhouse pest.

***L. longulum,** *Dougl.* (Females only.) Sparingly on leaves of *Heliconia metallica*, *Rheedia sp.*, and on *Averrhoa Carambola* and *Spathiphyllum blandum.*

*†**L. nigrum,** *Neitner.* (Females only.) On *Heliconia metallica* and *Ficus sp.*

***L. perforatum,** *Newst.* (Females only.) Swarming on *Caryota* and other palms; and freely also on *Eugenia malaccensis*, *Diospyros sp.*, *Cinnamonum sp.*, *Coccoloba sp.*, and *Philodendron sp.* This flat black shining species is very conspicuous on the white undersides of the leaves of certain palms.

***L. hemisphaericum,** *Targ. Tozz.* (Females only.) On *Coffea liberica*, *C. arabica*, *Stangeria schizodon*, *Eranthemum cinnabarinum*, *E. albiflorum*, *Clerodendron speciosum*, *Bowenia spectabilis*, *Casimiroa edulis*, *Nepenthes rafflesiana*, *Eugenia malaccensis*, *Leucadendron argenteum*, *Alsophila pruinata*, *Chrysophyllum Cainito*, *Citrus Aurantium*, *Justicia quadrifaria*, *J. Gendarussa*, *Jacobinia ghiesbreghtiana*, *Cassipourea verticillata*, and many ferns.

§**L. persicæ** var. **Coryli,** *Linn.* (Females only.) On *Ribes sanguineum*, *R. prostratum*, *Wistaria sp.*, *Cytisus scoparius*, *Cotoneaster spp.*, and *Spiraea canescens.* This species is generally known as the "gooseberry scale" in this country.

§**Lecanium capreæ**, *Linn.* (Females only.) On *Ulmus campestris.*

***L. oleæ**, *Bernard.* (Females and male puparia.) On *Spathelia simplex*, *Miconia magnifica*, *Aralia elegantissima*, *Elaeodendron orientale*, *Carissa spinarum*, *Strophanthus sp.*, *Diospyros mabacca*, *Cephaelis Ipecacuanha*, *Anthurium magnificum*, and *Catesbaea spinosa.* The brown form, *L. testudo* of Curtis, is also common.

Pulvinaria, *Targ. Tozz.*

§**P. vitis**, *Linn.* On *Salix sp.* (Females only.)

***P. floccifera**, *Westwood.* (Females only.) On *Anguloa Clowesii*, *Lycaste Skinneri*, and *Plumeria rubra.*

Vinsonia, *Signoret.*

***V. stellifera**, *Westwood.* (Females only.) On *Tovomita amazonica.* A few imperfect females only of this beautiful species.

Physokermes, *Targ. Tozz.*

§ **P. abietis**, *Geoffroy.* (Females only.) On spruce fir (*Picea excelsa*). This interesting and highly protective form is not known to attack any other kind of plant.

Dactylopiinae.

Asterolecanium, *Targ. Tozz.*

*†**A. bambusae**, *Boisduval.* (Females only.) Abundant on *Bambusa vulgaris* and other species of bamboo in the palm house.

Ripersia, *Signoret.*

*‡**R. filicicola**, *Newst.* (All stages but the perfect male.) On *Trichomanes spicatum.* Discovered by Mr. Nicholson in February, 1897. Easily distinguished by the beautifully iridescent filaments forming the outside of the ovisacs of the female and the puparia of the male.

Dactylopius, *Costa.*

D. citri, *Boisduval.* (In all stages.) The most injurious of all the "mealy bugs" and almost omnivorous. Mr. Nicholson also obtained it out of doors on ivy.

***D. longispinus**, *Targ. Tozz.* (Females only.) On *Stangeria schizodon*, *Flacourtia sepiaria*, various ferns, and coffee leaves. It is less common than the preceding species.

Cryptococcus, *Dougl.*

§**C. fagi**, *Barensprung.* (Females only.) This is the beech coccus which is sometimes so destructive in the British Isles.

Apterococcus, *Newst.*

§**A. fraxini**, *Newst.* (Females and male puparia.) Confined exclusively to the ash (*Fraxinus excelsior*).

Coccus, *Linn.*

*†**C. tomentosus**, *Lam.* (In all stages.) On *Opuntia fulgida*. This insect was recorded (Ent. Mo. Mag., 1897, p. 76) as new to Britain. But there is a record in vol. liv. of the Botanical Magazine of its occurrence at Kew in the year 1827, on the spineless cochineal fig. (*Cactus cochinellifer*). It is apparently one of the three species of cochineal used in commerce.

Gymnococcus, *Dougl.*

*‡**G. agavium**, *Dougl.* (Females only.) Recorded for the first time and described as new by Mr. Douglas, Ent. Mo. Mag., 1888, p. 150.

Ortheziinae.

Orthezia, *Bosc.*

***O. insignis**, *Dougl.* (All stages.) Chiefly on Stove Acanthads, It is a beautiful species, but very hard to destroy. (See also Kew Bull., 1895, p. 162.)

Monophlebinae.

Icerya, *Sign.*

*†**I. Ægyptiacum**, *Douglas.* (Females only.) The plant on which the insects were imported was, fortunately, destroyed, and no trace of this destructive species has since been seen.

LEPIDOPTERA.

By R. South, F.E.S.

The accompanying list of one hundred and fifty species of moths and butterflies observed in the gardens can only be regarded as provisional. The records upon which it is based were furnished to the authorities at Kew by several observers and at various dates during the past six or seven years. So far there does not appear to have been any serious attempt made in the direction of ascertaining the lepidopterous fauna of the area. There is little doubt that if all the methods adopted by the practical entomologist in his field work were brought into action the results during even a single season would considerably increase the present total.

Among these devices is "sugaring," which is much in vogue among collectors for the capture of the night-flying moths. For this purpose a mixture of sugar, or treacle, and beer is prepared and a narrow streak of this is brushed down the tree trunk about an hour before dark. The lantern is then brought into play and its rays turned on the baited trees when, if the night is favourable, moths in greater or less numbers will be found settled on the margins of the sticky patches with their long tongues thrust into the seductive mixture. The revellers may then be easily secured in boxes, or, if not otherwise required, their names

noted on the spot. A few experiments in "sugaring" were essayed during the autumn of 1902, but the weather was so ungenial that very few moths were obtained.

Artificial light has a great attraction for many moths, and illuminated traps are used by some entomologists with grand results. Possibly it might be arranged for some such contrivance to be set up in one of the glades of the gardens, or somewhere in the vicinity of the lake.

Obviously, the practice in the gardens is to destroy at once all creatures found devouring the leafage of plant or shrub. If, however, these could be preserved, together with a leaf or spray of the plant upon which they feed, at least until their identity has been ascertained, it would be a useful means of adding many names of insects to the lists, especially those of the Lepidoptera. A very large number of species belonging to this order feed only at night, and these may then be readily found by simply examining shrubs and low growing plants by the aid of a lantern.

Seeing how frequently insects of foreign origin are brought into England, even among consignments of garden produce, it might be expected that various exotic species of Lepidoptera would put in an appearance at Kew. The only record of this nature appears to be that of a specimen of *Erebus odora*, L., a member of the Noctuid family *Erebidae*. This moth, which measures some six or seven inches in expanse, is a native of Jamaica; it was found in the orchid pit in the gardens in 1899.

In addition to the species enumerated in the list seven others have been recorded, but these have not been seen by the compiler and it seems desirable to await further evidence of their existence in the gardens before including them in the list. They may, however, be mentioned here and are as follows:—

Leucophasia sinapis, L. (2 specimens in poor condition and 1 other, June, 1896.)

Pamphila palæmon, Pall. (5 specimens, all seen same day, 1895.)

Pelosia muscerda, Hufn. (3 specimens found at dark on quince tree, 1902.)

Apamea connexa, Bork. (1 specimen in poor condition, 1899.)

Agrotis pyrophila, Fb. (1 specimen, marked "Kew," no date.)

Acontia luctuosa, Esp. (1 specimen, marked "Kew," no date.)

Catocala sponsa, L. (Fairly common, attracted by light, 1900.)

PIERIDAE.

Pieris brassicæ, *L.* "Large White."

P. rapæ, *L.* "Small White."

Pieris napi, *L.* "Green-veined White."

Euchloë cardamines, *L.* "Orange Tip."

Gonepteryx rhamni, *L.* "Brimstone."

NYMPHALIDAE.

Argynnis euphrosyne, *L.* "Pearl-bordered Fritillary."

A. paphia, *L.* "Silver-washed Fritillary."

Vanessa polychloros, *L.* "Large Tortoise-shell."

V. urticæ, *L.* "Small Tortoise-shell."

V. io, *L.* "Peacock."

V. atalanta, *L.* "Red Admiral."

V. cardui, *L.* "Painted Lady."

SATYRIDAE.

Pararge egeria, *L.* "Speckled Wood."

P. megaera, *L.* "The Wall."

Epinephele ianira, *L.* "Meadow Brown."

E. tithonus, *L.* "Large Heath."

Aphantopus hyperanthus, *L.* "The Ringlet."

Coenonympha pamphilus, *L.* "Small Heath."

LYCAENIDAE.

Zephyrus quercus, *L.* "Purple Hairstreak."

Callophrys rubi, *L.* "Green Hairstreak."

Chrysophanus phloeas, *L.* "Small Copper."

Lycaena icarus, *Rott.* "Common Blue."

Cyaniris argiolus, *L.* "Azure Blue."

ERYCINIDAE.

Nemeobius lucina, *L.* "Duke of Burgundy."

HESPERIIDAE.

Hesperia malvæ, *L.* "Grizzled Skipper."

Augiades sylvanus, *Esp.* "Large Skipper."

SPHINGIDAE.

Sphinx ligustri, L. "Privet Hawk."

Smerinthus ocellatus, *L.* "Eyed Hawk."

S. populi, *L.* "Poplar Hawk.

Dilina tiliae, *L.* "Lime Hawk."

ZYGAENIDAE.

Zygaena filipendulae, *L.* "Six-spotted Burnet."

CYMBIDAE.

Hylophila prasinana, *L.* "Green Silver Lines.'

NOLIDAE.

Nola cucullatella, *L.* "Short Cloaked."

EUCHELIIDAE.

Callimorpha dominula, *L.* "Scarlet Tiger."

ARCTIIDAE.

Arctia caia, *L.* "Tiger Moth."

A. villica, *L.* "Cream Spot Tiger."

Spilosoma lubricipeda, *Esp.* "Buff Ermine.'

S. menthastri, *Esp.* "White Ermine."

HEPIALIDAE.

Hepialus humuli, *L.* "Ghost Swift."

H. lupulinus, *L.* "Common Swift."

COSSIDAE.

Zeuzera pyrina, *L.* "Leopard Moth."

LYMANTRIIDAE.

Euproctis chrysorrhœa, *L.* "Brown Tail."

Stilpnotia salicis, *Fues.* "Satin Moth."

Dasychira pudibunda, *L.* "Pale Tussock."

Orgyia antiqua, *L.* "Common Vapourer."

LASIOCAMPIDAE.

Eriogaster lanestris. *L.* "Small Eggar."

Lasiocampa quercus, *L.* "Oak Eggar."

Cosmotriche potatoria, *L.* "The Drinker."

DREPANIDAE.

Drepana binaria, *Hufn.* "Oak Hook-tip"

Cilix glaucata, *Scop.* "Chinese Character"

NOTODONTIDAE.

Dicranura vinula, *L.* "Puss Moth."

Pygaera curtula, *L.* "Chocolate-tip."

Phalera bucephala, *L.* "Buff-tip."

CYMATOPHORIDAE.

Polyploca flavicornis, *L.* "Yellow-horned."

NOCTUIDAE.

Bryophila perla, *Fab.* "Marbled Beauty."

Acronycta tridens, *Schiff.* "Dark Dagger."

A. psi, *L.* "The Dagger."

A. megacephala, *Fab.* "Poplar Grey."

Diloba caeruleocephala, *L.* "Figure-of-eight Moth."

Leucania conigera, *Fab.* "Brown-line Bright-eye."

L. comma, *L.* "Shoulder-striped Wainscot."

L. impura, *Hübn.* "Smoky Wainscot."

L. pallens, *L.* "Common Wainscot."

Calamia phragmitidis, *Hübn.* "Fen Wainscot."

Gortyna ochracea, *Hübn.* "Frosted Orange."

Hydraecia nictitans, *Bork.* "Ear Moth."

H. micacea, *Esp.* "Rory Rustic."

Axylia putris, *L.* "The Flame."

Xylophasia lithoxylea, *Fab.* "Light Arches."

X. monoglypha, *Hufn.* "Dark Arches."

Dipterygia scabriuscula, *L.* "Bird's Wing."

Epineuronia popularis, *Fab.* "Feathered Gothic."

Mamestra brassicae, *L.* "Cabbage Moth."

M. persicariae, *L.* "The Dot."

M. didyma, *Esp.* "The Common Rustic."

Miana strigilis, *Clerck.* "Marbled Minor."

Grammesia trigrammica, *Hufn.* "Treble-bar."

Caradrina quadripunctata, *Fab.* "Pale mottled Willow."

Agrotis suffusa, *Hübn.* "Dark Sword-grass."

Agrotis exclamationis, *L.* "Heart and Dart."

A. corticea, *Hübn.* "Heart and Club."

A. nigricans, *L.* "Garden Dart."

Noctua augur, *Fab.* "Double Dart."

N. plecta, *L.* "Flame Shoulder."

N. c.-nigrum, *L.* "Setaceous Hebrew Character."

N. festiva, *Hübn.* "Ingrailed Clay."

N. umbrosa, *Hübn.* "Six-striped Rustic."

N. xanthographa, *Fab.* "Square-spot Rustic."

Triphaena comes, *Hübn.* "Lesser yellow Underwing."

T. pronuba, *L.* "Large yellow Underwing."

Naenia typica, *L.* "The Gothic."

Pachnobia rubricosa, *Fab.* "Red Chestnut."

Taeniocampa gothica, *L.* "Hebrew Character."

T. stabilis, *View.* "Common Quaker."

Orthosia suspecta, *Hübn.* "The Suspected."

Anchocelis litura, *L.* "Brown-spotted Pinion."

Cerastis vaccinii, *L.* "The Chestnut."

Xanthia citrago, *L.* "Orange Sallow."

X flavago, *Fab.* "The Sallow."

Calymnia trapezina, *L.* "Dun-bar."

Hecatera serena, *Fab.* "Broad-barred White."

Agriopis aprilina, *L.* "Marveil du Jour."

Euplexia lucipara. *L.* "Small Angle Shades."

Phlogophora meticulosa, *L.* "Angle Shades."

Aplecta nebulosa, *Hufn.* "Grey Arches."

Cucullia umbratica, *L.* "The Shark."

Plusia chrysitis, *L.* "Burnished Brass."

P. gamma, *L.* "Silvery Moth."

Catocala nupta. *L.* "Red Underwing."

Geometridae.

Uropteryx sambucaria, *L.* "Swallow-tail Moth."

Rumia luteolata, *L.* "Brimstone Moth."

Metrocampa margaritaria, *L.* "Light Emerald.'

Crocallis elinguaria, *L.* "Scalloped Oak."

Biston hirtaria, *L.* "Brindled Beauty."

Hemerophila abruptaria, *Thnb.* "Waved Umber."

Geometra papilionaria, *L.* "Large Emerald."

Hemithea strigata, *Müll.* "Common Emerald."

Acidalia aversata, *L.* "Riband Wave."

Bapta temerata, *Hübn.* "The Clouded Silver."

Bupalus piniaria, *L.* "The Bordered White."

Abraxas grossulariata, *L.* "The Magpie."

Larentia didymata, *L.* "Twin-spot Carpet."

Melanthia bicolorata, *Hufn.* "Blue-bordered Carpet."

Melanippe sociata, *Bork.* "Common Carpet."

M. montanata, *Bork.* "Silver-ground Carpet."

Camptogramma bilineata, *L.* "The Yellow Shell."

Cidaria testata, *L.* "The Chevron."

Eubolia limitata, *Scop.* "Small Mallow."

Tanagra atrata, *L.* "The Chimney Sweeper.'

PYRALIDAE.

Pyralis farinalis, *L.* "The Meal Moth."

Hypsopygia costalis, *Fab.* "The Gold Fringe."

Eurrhypara urticata, *L.* "Small Magpie."

Scopula olivalis, *Schiff.*

Pionea forficalis, *L.* "Garden Pebble."

Crambus pratellus, *L.* "Dark Inlaid Veneer."

C. inquinatellus, *Schiff.* "The Barred Veneer."

C. geniculeus, *Haw.* "Elbow-striped Veneer."

C. culmellus, *L.* "Small Straw-coloured Veneer."

PTEROPHORIDAE.

Alucita pentadactyla, *L.* "The White Plume Moth."

TORTRICIDAE.

Tortrix xylosteana, *L.* "Forked Red-bar."

T. sorbiana, *Hübn.* "The Hazel Tortrix."

T. ribeana, *Hübn.* "Common Oblique-bar."

T. viridana, *L.* "The Green Tortrix."

Penthina variegana, *Hübn.*

Hedya ocellana, *Fab.*

Aspis udmanniana, *L.* "The Udmannian."

TINEIDAE.

Blabophanes rusticella, *Hübn.*

YPONOMEUTIDAE.

Yponomeuta cognatellus, *Hübn.*

Y. evonymellus, *L.* "Full spotted Ermine."

ELACHISTIDAE.

Elachista argentella, *Clerck.*

GALLS.

The puncture of plant-tissues by insects, mites, and other small animals, the deposition therein of ova, and the subsequent development of the animals, induce hypertrophies of various kinds which are known as "galls." An account of the galls observed in the gardens, and the names of the insects responsible for them, therefore finds its natural position here.

GENERAL.

By Prof. J. W. H. Trail, F.R.S.

The few galls enumerated below must represent only a small part of the forms that occur in or near the gardens, but they are those seen by myself in passing through at various times. Most of them were found in the Queen's Cottage Grounds one forenoon in July, 1899. No doubt many others would reward careful and systematic work throughout the year: yet the trees, shrubs, and herbs cultivated in the gardens appear to be remarkably free from galls. Those mentioned here were found almost exclusively on the wild flora. For convenience of reference they are arranged under the host-plants after the method usually followed.

Hypericum quadratum. Terminal leafbud swollen, its two outer leaves touching edge to edge and slightly hypertrophied and keeled near their bases, often reddish. Caused by a midge, *Perrisia serotina* (Winn.).

Tilia. On the species of this genus galls are frequent.

(*a.*) On inflorescences, on midribs of bracts, on peduncles or pedicels are fleshy globular or oval swellings, about the size of peas, with a smooth surface, yellowish green or red. Each contains one or more cavities tenanted by larvæ of a midge, *Contarinia tiliarum*, Kffr.

(*b.*) Margin of leaf is slightly thickened but not discoloured, and forms a narrow tube here and there towards base. Usually the galls are short, but sometimes a number are united so as to extend an inch or more along the margin. In the tubes live gall-mites, *Eriophyes tetratrichus*, Nal.

(*c.*) Upper surface of leaf bears reddish slender galls like small nails in form fixed to it by one end. These are hollow, and open by a small hole on the lower surface. In them live gall-mites, *Eriophyes Tiliae* (Pagenst.).

Acer Pseudoplatanus, *L.* Upper surface often crowded with small reddish prominent galls, each hollow, opening by a hole on the lower surface, among hairs. In each live gall-mites, *Eriophyes macrorhynchus*, Nal.

Trifolium repens, *L.* Pinnæ remain folded, but become thickened, inflated, and usually reddened. Caused by a gall-midge, *Perrisia Trifolii* (F. Löw).

Lotus uliginosus, *Schkuhr.* Budgalls formed of an atrophied bud surrounded by stipules and stunted leaves, all somewhat thickened ; caused by a midge (? *Perrisia loticola*, Rübs.).

Rubus. A bramble showed on leaves and shoots patches of a pale grey-green colour owing to the growth of hairs, caused by a gall-mite, *Eriophyes gibbosus*, Nal.

Rosa spp.

(*a.*) On leaves smooth globular thin galls, up to 5 mm. in diameter, often red on one side, caused by a gallfly, *Rhodites Eglanteriae*, Hartig.

(*b.*) On leaves or young twigs, less often on the young hips, occur rounded masses from the size of a pea to that of a walnut, covered with green or red branching filaments. In the smaller examples are one or two oval cavities ; in the large galls are many similar cavities, each in a hard covering. In each lives a larva of *Rhodites Rosae* (L.). This is the " Bedeguar " gall.

Pyrus Malus, *L.* Leaves hypertrophied, and bulged upwards in places or loosely rolled backwards, reddened, caused probably by *Aphis Mali*, Fabr.

Crataegus Oxyacantha, *L.*

(*a.*) Terminal buds abort, their leaves and stipules being crowded in a rosette and covered with green or dull-red warts and coarse hairs, caused by a gall-midge, *Perrisia Crataegi* (Winn.).

(*b.*) Leaves affected much on *Pyrus Malus*, caused by an *Aphis.*

(*c.*) Margins of lobe of leaf rolled backwards into a narrow tube filled with brown hairs, among which live mites, *Eriophyes goniothorax*, Nal.

Galium verum, *L.*

(*a.*) Soft fleshy smooth rounded gall of stem near a node (much like (*a*) on *Tilia* caused by a gall-midge, *Perrisia Galii* (H. Löw.).

(*b.*) Leaves rolled into narrow tubes by a mite, *Eriophyes Galii*, (Karpelles).

Sambucus nigra, *L.* Leaf margins rolled upwards to form slender tubes by a mite, *Epitrimerus trilobus*, Nal.

Achillea Millefolium, *L.* On the stem, often close to the surface of the ground or just below it, or in the axils of leaves, or on the leafstalks or leafblades, or among the flowers in the heads, occur subcylindric galls about as large as a grain of barley, of firm fleshy texture, shining, at first green but becoming very dark, and bursting open at the summit with several recurved lobes. These galls are the work of a midge, *Hormomyia Millefolii*, H. Loew, which is now referred to the section *Rhopalomyia*. Often common.

Hieracium Pilosella, *L.* Midrib of leaves swollen into spindle-shaped thickenings of small size.

(*a.*) Inclosing a larval cell, the work of a gallfly (*Aulax*) or of a midge. Only one example found.

(*b.*) Loosely grouped cells fill the swelling. Among them live minute eel-worms (*Tylenchus sp.*), which form the galls.

Veronica Chamaedrys, *L.* Whitish, or less often pale reddish-green, masses at the ends of vegetative shoots consist of the terminal leaves thickly covered on the back with whitish hairs, placed edge to edge so as to enclose a space occupied by reddish-yellow larvae of a midge, *Perrisia Veronicae* (Vallot). Not seldom the leaves are caused to produce a very similar hairy covering by action of gall-mites, *Eriophyes anceps*, Nal. Sometimes both animals attack the same shoots. When alone the mites cause a more diffuse hairy coat than do the midges.

Nepeta Glechoma, *Benth.* Upper surface of leaf has on it a number of small hairy galls shaped like rifle-bullets, each opening by a narrow hole on lower surface of leaf; they fall off at end of autumn, each leaving a hole in leaf; caused by a midge, *Oligotrophus bursarius* (Bremi).

Ulmus sp.

(*a.*) Leaf bears on upper surface flask-shaped, thin-walled pale green or reddish galls, 10 mm. or more in height, attached by a narrow neck, through which the inner cavity opens on lower surface of leaf; caused by *Tetraneura Ulmi*, De Geer.

(*b.*) Leaf hypertrophied, yellowish green, irregularly rolled backwards and rough, one side only, or almost the whole leaf galled; caused by *Schizoneura Ulmi*, *L.*

Urtica dioica, *L.* On the bases of the leaves, and also on young stems and inflorescences, occur roundish fleshy pale-green galls, about the size of a small pea frequently, which open usually on the upper surface. They are produced by a gall-midge, *Perrisia Urticae*, (Perris).

Juglans regia, *L.* Patches in the leaf, bounded by veins, become hypertrophied, bulged upwards, with a depression on the lower surface lined with brown hairs, among which live gall-mites, *Eriophyes tristriatus*, var. *erineus*, Nal.

Betula alba, *L.* On the various forms of this species the leaf-blades are sometimes studded with numerous small hard bodies, prominent especially on the upper surface. In transverse section they are seen to inclose a small cavity that opens on the lower surface of the leaf by a narrow tube. In the cavity, among hairs, live the tiny mites that caused the gall, by name *Eriophyes Betulae*, Nal. The warts have received the name of *Cephaloneon betulinum*, Bremi.

Alnus glutinosa, *Medic.* Gall-mites produce on leaves at least two kinds of gall.

(*a.*) Small red or otherwise discoloured nearly rounded or oval prominences, about 2 or 3 mm. in diameter; each is a pouch opening on lower surface by a small hole partly closed by hairs. This form is *Cephaloneon pustulatum*, Bremi, and is produced by *Eriophyes laevis*, Nal.

(*b.*) On lower surface—rarely also on upper—occur patches of closely set hairs (*Erineum alneum*, Pers.) unicellular, with irregularly thickened heads. The hairs, at first white, soon become rusty brown. Among them live the mites, *Eriophyes brevitarsus*, Fockeu.

Quercus. Mr. Rolfe's list of galls observed in Kew Gardens on the species of *Quercus* includes the few galls of the *Cynipidæ* or Gall-flies that I have noticed there. I shall therefore refer only to the ones produced on leaves by gall-midges, and those of a gall-mite.

Q. pedunculata, *Ehrh.*

(*a.*) A lobe is folded backwards and becomes thickened and discoloured with yellowish spots. Below it lie larvæ of a midge, *Macrodiplosis dryobia* (F. Löw).

(*b.*) A narrow portion in the sinus, or on one side of a lobe, becomes folded upwards and slightly discoloured and thickened. Below it lie larvæ of a midge, *Macrodiplosis volvens*, Kffr.

(*c.*) Lower surface abnormally hairy along the veins, due to mites,—*Eriophyes quercinus*, Can.

Fagus sylvatica, *L.*

(*a.*) On upper surface of leaves rise usually several galls of the form of a rifle-bullet, up to 3 mm. in height and covered with short hairs. They fall off, leaving a round thickened ring in the leaf. They are the work of a gall-midge, *Oligotrophus annulipes* (Hartig).

(*b.*) Leaves near tip of twig remain small, become thickened and deeply folded along the veins, and are covered with hairs which change from grey to pale brown. Among these live gall-mites, probably *Eriophyes stenaspis*, Nal.

Salix alba, *L.*, and other species. Oval galls in leaf-blade projecting on both surfaces, especially below, up to 10 mm. in length, green or red, fleshy. Produced by a saw-fly, *Nematus gallicola*, Steph.

S. aurita, *L.*, and other species of the section *Capreae* bear galls.

(*a.*) Terminal buds remain abortive with leaves short and crowded into a rosette or resembling the scales of a cone. Among the leaves lives the larvæ of a gall-midge, *Rhabdophaga rosaria* (H. Löw).

(*b.*) In leaves, usually near the midrib or large veins, are almost globular galls, under 2 mm. in diameter, hard, becoming pale above, very prominent below, where each opens (Winn.). In each lives one larva of a midge, *Oligotrophus Capreae*, (Winn).

S. viminalis, *L.* Margin of leaf rolled backwards, thickened, and yellowish-green or red in colour, the length varying with the degree of union of galls. Produced by a midge, *Perrisia marginem-torquens*, (Winn.).

Populus alba. *L.* A few twigs showed spindle-shaped swellings in which was an irregular cavity in the pith. These galls may have been the work of a beetle, *Saperda populnea*, *L.*

P. nigra, *L.* Aphides (of the genus *Pemphigus*) produce various forms of galls on all the varieties of this species, all stages of development of the insects being found in them.

(*a.*) Galls similar in form and structure to those on *P. alba.*

(*b.*) On young twigs and on bases of petioles are oval often decurved galls up to 15 mm. long, narrowed towards the tip, where each ends in an opening surrounded usually by a wrinkled margin. They are formed by *Pemphigus bursarius*, L.

(*c.*) Leaf-blade folded backward to inclose a space (which is enlarged by the blade becoming irregularly hypertrophied) somewhat fleshy, often yellowed or reddened. In the space live numerous examples of *Pemphigus affinis*, Kalt.

(*d.*) Leaf-blade much hypertrophied near the base forming a large hollow which opens by a slit along the midrib on the lower surface. Caused by *Pemphigus marsupialis*, Courchet.

Taxus baccata, *L.* Terminal buds remain short, the leaves overlapping so as to resemble the scales of a cone, but not changing much in colour. In the centre of the gall is the larva of the gall-maker, a midge named *Perrisia Taxi*, (Inchbald).

Picea excelsa, *Link.* Galls at tips of twigs resembling pine-apples about 15 to 20 mm. long, the terminal bud remaining short with crowded needles, each becomes broad and fleshy at its base and partly united with one another, inclosing between them cavities inhabited by *Chermes strobilobius*, Kalt., *aggr*; but the life-history must be studied to determine whether it is *C. strobilobius*, Kalt., *segr.*, or *C. lapponicus*, Cholod. Other species related to *Picea excelsa* also show a few galls of the same appearance.

P. orientalis, *Carr.* Twig scarcely bent or thickened, bearing along one side needles enlarged at their bases but not joined to one another. Between them live numerous examples of *Chermes orientalis*, Dreyfus.

P. sitchensis, *Trautv. and Mey.* Galls somewhat similar to those on *P. excelsa*, only differing in being a deeper green, occur on this species; they may be the work of *Chermes Abietis, L.*

OAK-GALLS.

By R. A. Rolfe, A.L.S.

Some years ago I paid considerable attention to the Oak-galls occurring in the Quercetum at Kew, particularly with respect to their botanical range (*see* Entomologist, 1881, pp. 54–58, and 1883, pp. 29–32). Attention was called to the subject by the discovery of the common currant-gall on an evergreen oak of doubtful origin, but which is now agreed to be a hybrid between *Q. pedunculata*, Willd., and *Q. Ilex*, L. The occurrence of numerous species of *Quercus* from various parts of the world growing in close proximity, would naturally furnish an opportunity for the spread of certain galls, if such species formed a suitable food-plant for the gall-making insect, and although I succeeded in finding galls on six European and one Japanese species of *Quercus*, I never found a gall of the common oak on either an American species or on the European *Q. Cerris*, L., the "mossy-cupped" oak, even when the branches interlaced, which shows the existence of some barrier to their dispersal.

About that time the theory—now fully established—that certain galls, found respectively in spring and autumn, and very different in structure and appearance, were only seasonal forms of the work of the same insect, was attracting great attention, and the presence of the common currant-gall on the hybrid oak above-mentioned led me to search for the occurrence of the common spangle gall, the corresponding autumnal form, but always without success, though I found two other autumnal galls on it, as well as two vernal forms, making five in all.

It will be observed that several galls are absent from the following list which theoretically ought to occur, the corresponding seasonal form having been found, but it should be added that it was not found possible to make an extended search at certain seasons, and in recent years, and it is highly probable that several others will yet be added to the list. During 1902 I again paid some attention to the vernal forms, but without making any addition to the list; the season seems to have been unfavourable, for those which are usually common were only met with in limited numbers.

Quercus pedunculata, *Willd.* Probably no species of plant is so subject to the attacks of gall-making insects as the common oak, *Quercus pedunculata*, Willd. Almost every part of the plant is affected by them; roots, branches, buds, leaves, stamens, ovaries, and fruits; and their variation in size, appearance, and internal

structure, is as great as their diversity of situation. Nearly a hundred different European kinds have been recorded, and of these about forty are British, of which twenty-one have been observed at Kew. Although it is now known that certain galls which are very diverse in appearance, and occur on different parts of the plant, are seasonal variations, it will be convenient to arrange the following notes according to the different organs of the plant on which the galls occur.

Root galls.—On the smaller roots, during autumn and winter, are found galls which are soft and red when fresh, but become brown and hard when dry, consisting of from one to ten chambers, each containing a larva of the insect *Biorhiza aptera*, Bosc. These on escaping in the spring are believed to lay their eggs in the young buds, giving rise to the well-known "Oak-apples," or "King Charles' apples," which are common in the collection. It is probable that the root galls are common too, though it is only on rare occasions that an opportunity of searching for them occurs.

Bud galls.—At the apex of terminal or lateral twigs, in early summer, occurs the multicellular gall known as the "Oak-apple" or "King Charles' apple," which is the summer gall made by *Biorhiza aptera*, Bosc., mentioned in the preceding paragraph. The galls are large, often over an inch across, spongy and soft when fresh, often reddish or yellowish in colour, with a harder central portion, consisting of many chambers aggregated together, each containing a single larva.

The Artichoke-gall takes its name from its resemblance to a small globe artichoke, the gall being enclosed within a mass of enlarged bracts or leaf-scales, $\frac{3}{4}$ to 1 inch long. It occurs in autumn, and is made by *Andricus gemmae*. The spring form of the gall, which is hairy, and occurs on the catkins, has not been observed at Kew.

Terminal buds or young shoots swollen, the central cavity covered above with a thin membrane, and containing an egg-shaped inner gall, which is attached to the bottom of the cavity. The gall occurs sparingly in June, and is made by *Andricus inflator*, Hartig.

Terminal or lateral buds transformed into globular galls, about $1\frac{1}{2}$ to 2 lines broad, yellow or red in colour, and projecting from dry leaf-scales. The gall occurs in autumn, and is the autumn form of *Andricus inflator*, Hartig, described above, formerly known as *Aphilothrix globuli*, Hartig.

Terminal buds or young shoots, or sometimes the leaves, transformed into a swollen, somewhat twisted body, containing a kidney-shaped inner gall, or occasionally two or three. It occurs commonly in May and June, and is made by *Andricus curvator*, Hartig. The autumn form of the gall, formerly known as *Andricus collaris*, Hartig, has not been observed at Kew. It occurs on the buds, and is oval, 1 to $1\frac{1}{2}$ lines long, pale yellow or red brown with a darker nipple-like tip.

Terminal buds transformed into stalked galls, three to six lines long, with the slender stalk nearly as long as the gall. Occurs

from June to August, somewhat rarely, and is made by *Andricus callidoma*, Giraud. The spring form of the gall, formerly known as *Andricus cirrhatus*, Adler, which occurs in cottony groups on the catkins, has not been observed at Kew.

Terminal buds transformed into oval green galls, 2½ to 3 lines long, green spotted with white. It occurs in May and June, and is made by *Andricus albopunctatus*, Schl.

Terminal buds transformed into brown, ovate-oblong, obtuse galls, about 1 to 1½ lines long, made by *Andricus autumnalis*, Hartig. Examples are preserved in the Kew Museum, which were collected at Kew, in the autumn of 1876, by the late Miss E. A. Ormerod. The spring form of the gall, formerly known as *Andricus ramuli*, L., which occurs in crowded cottony masses on the catkins in June, has not been observed.

The common marble gall, which takes its name from its resemblance to a marble in shape and size, is generally common in autumn, and persists on the branches. The galls are transformed terminal or lateral buds, and are made by the insect known as *Cynips Kollari*, Hartig.

Leaf galls. On the veins, situated between two brown scales, occur small oval smooth and brittle galls, about a line long, pale green or yellow, with small red spots. It occurs commonly in autumn, and is made by *Andricus ostreus*, Giraud. It is believed that the bud gall known as *Spathegaster aprilinus* is the spring form of this gall, but it has not been observed at Kew.

The gall of *Andricus curvator*, Hartig, mentioned above as occurring on the buds or young shoots, also occurs on the petioles and nerves of the leaf.

On the midrib or principal veins, occur large globular thick-walled galls, 4 to 6 lines in diameter, which are soft and fleshy when fresh, and yellowish-green or red on one side. It is made by *Dryophanta folii*, L. (D. scutellaris), and is fairly common in autumn. The spring form, which occurs on buds, and is much smaller, velvety, and purple in colour, has not been observed at Kew.

On the midrib and principal veins, occur small naked and shining galls, 2 to 2½ lines in diameter and slightly depressed, pale yellow and more or less red on one side. They are made by *Dryophanta divisa*, Hartig, and are fairly common in autumn. The spring form of the gall, which occurs on the buds, and is about 2 lines long, broadened above, yellowish green or reddish, dotted with white, has not been observed at Kew.

Nearly allied to the two preceding, is a gall 2½ to 4½ lines in diameter, pale yellow or banded or suffused with red on the sunny side; the skin is rough with small protuberances. It occurs in autumn and is not rare. It is made by *Dryophanta longiventris*, Hartig. The spring form, which is oblong, 1 line long, greenish and covered with white hairs, has not been observed at Kew.

The silk-button gall occurs gregariously on the under surface of the leaf, between the veins. It takes its name from the shape, being circular, thick, and depressed in the centre, and covered

with appressed silky brown hairs. It is made by *Neuroterus numismatis*, Oliv., and is usually abundant. The spring form of the gall, which is about twice as large, and sunk in the leaf, scarcely projecting on either surface, and green, has not been observed at Kew.

The common spangle gall occurs gregariously on the under surface of the leaves, between the veins, in autumn. It is flat, with a swollen depressed-conical centre, 1½ to 2 lines in diameter, and covered on the upper surface with tufts of rusty brown hairs, which are bright red when young. The side next to the leaf is smooth. It is usually very abundant, sometimes even disfiguring the leaves. The maker was formerly called *Neuroterus lenticularis*, Oliv., but it is now known to be the autumn form of the well-known currant gall. The spring form occurs both on the young leaves and catkins, and is globular and shining, about the size of a red currant, soft and juicy, and green more or less suffused or streaked with red where exposed to the sun. The spring form is usually common, but not nearly so abundant as the autumn form.

The scarce spangle gall differs from the preceding in being smaller, distinctly concave or saucer-shaped, owing to the margin being turned-up, and the hairs are smaller, less numerous, and rather lighter in colour. It is usually very local, but gregarious where found. The maker is known as *Neuroterus laeviusculus*, Schenck. The spring form of the gall, which is ovoid, smooth, ½ to 1 line long, and greenish yellow in colour, has not been observed at Kew.

The smooth spangle gall is similar to the preceding in size, and has the margins somewhat curved up, but there are no hairs except on the side next to the leaf. The colour is whitish green, often margined or suffused with red. It is made by *Neuroterus fumipennis*, Hartig, and occurs commonly in autumn. It is usually less gregarious than the three preceding. The spring form of the gall, which is pea-shaped, 2 lines in diameter, and bears a number of soft white hairs, has not been observed at Kew.

Catkin galls. The currant gall occurs most characteristically on the catkins, and it has derived its name from its size and colour, and from the circumstance that frequently several occur on the same catkin, and thus resemble small bunches of currants. In other respects it agrees with the same gall as found on the leaves. It is common in spring, and is made by *Neuroterus baccarum*, L., its autumn form being the common spangle gall.

On the catkins also occur small oblong galls, about a line long, and somewhat, but not densely hairy. They occur in June and are rather rare. The maker is believed to be *Andricus amenti*, Giraud.

Quercus sessiliflora, *Salisb.* A native of Europe and Western Asia, sometimes referred to the preceding as a variety, though it is markedly different in its sessile fruits. Seven kinds of gall have been observed on it at Kew.

The currant gall, produced by *Neuroterus baccarum*, L., and its autumn form, the common spangle gall, are both common, and show precisely the same features as on *Q. pedunculata.*

The silk-button gall, produced by *Neuroterus numismatis*, Oliv., is also common on the undersides of the leaves in autumn.

The small globular gall on the nerves of the leaf, produced by *Andricus ostreus*, Giraud, is occasionally found, but is not common.

The pea-shaped galls, produced by *Dryophanta divisa*, Hartig, are sometimes found on the under surfaces of the leaves.

The marble gall, produced by *Cynips Kollari*, Hartig, is almost as common as on *Q. pedunculata*.

Lastly, the common oak-apple gall, the summer form of the gall produced by *Biorhiza aptera*, Bosc., is occasionally found. The autumn and winter form, which occurs on the roots, has not been searched for.

Quercus lanuginosa, *Thuill.*, more commonly known by its later name of *Q. pubescens*, Willd., is nearly allied to the preceding, but differs in having the leaves hairy beneath. It is a native of Europe and Western Asia. Four galls have been found on it at Kew.

The currant gall, produced by *Neuroterus baccarum*, L., and its autumn form, the common spangle gall, may generally be found in their proper season.

The marble gall, produced by *Cynips Kollari*, Hartig, is fairly common.

Lastly, the well-known oak-apple gall, the summer gall of *Biorhiza aptera*, Bosc., is often common. The autumn and winter form, which occurs on the roots, has not been searched for.

Quercus Toza, *Bosc.* A native of South-western Europe, having the leaves very pubescent beneath, in which respect it much resembles the preceding species. In the spring the young leaves and shoots are densely pubescent, giving the tree an almost woolly appearance. Three kinds of galls have been found on it.

Both the currant gall, produced by *Neuroterus baccarum*, L., and its autumnal form, the common spangle gall, are commonly met with.

The marble gall, produced by *Cynips Kollari*, Hartig, is also abundant, sufficiently so in the case of some young trees to injure the branches.

Quercus conferta, Kit. (*Q. Farnetto*, Ten.). A South European species, allied to *Q. sessiliflora* and *Q. lanuginosa*.

The common spangle gall, made by *Neuroterus baccarum*, L., occurs commonly on the undersides of the leaves during autumn, but I have not seen the spring form, the currant gall.

Quercus lusitanica, *Lam.* A widely-diffused South European oak, ranging from Portugal to Asia Minor. Four galls have been found on it at Kew.

The currant gall, produced by *Neuroterus baccarum*, L., occurs rarely, but the autumnal form, the common spangle gall, is often quite common.

The smooth spangle gall, produced by *Neuroterus fumipennis*, Hartig, is occasionally found, but seldom in quantity.

The small globular galls of *Dryophanta divisa*, Hartig, are also sometimes found on the undersides of the leaves.

Quercus infectoria, *Oliv.* This oak ranges from South-East Europe to Persia, and produces the well-known galls of commerce. Five different galls occur on it at Kew, as follows :—

The currant gall, produced by *Neuroterus baccarum*, L., and its autumnal form, the common spangle gall, are both found, though the examples are not often numerous.

The silk-button gall, produced by *Neuroterus numismatis*, Oliv., is occasionally found on the leaves of this oak.

The small gall made by *Andricus ostreus*, Giraud, on the midrib of the leaves is found, but not commonly.

On the leaves are also found examples of the spring form of the gall made by *Andricus collaris*, Hartig, formerly known as *A. curvator*, Hartig.

Quercus dentata, *Thunb.* A Japanese oak, having large hairy lobed leaves, much resembling those of *Q. pedunculata* in shape and texture.

The common spangle gall, made by *Neuroterus baccarum*, on the undersides of the leaves was observed a few years ago.

Quercus Turneri, *Willd.* A hybrid between *Quercus pedunculata*, Willd., and *Q. Ilex*, Linn. (the evergreen oak), and intermediate between them in almost every particular. The oak formerly identified by me with *Q. glandulifera*, Blume, proves to be a form of the same, and not the Japanese species supposed. Seven different kinds of galls occur upon it, all being common to it and to the parent, *Q. pedunculata.*

The currant galls of *Neuroterus baccarum*, L., are common on the leaves in the spring, but I have not observed them on the inflorescence. I have never been able to find the autumn form of the species, the common spangle gall, on this oak, and it may be that the hard epidermis of the leaf as it approaches maturity protects it from puncture by the insects.

The silk-button galls of *Neuroterus numismatis*, Oliv., are sometimes abundant on this oak, though a small number only come to maturity, and even these are generally smaller than when they occur on *Q. pedunculata.*

The artichoke gall, produced by *Andricus gemmae*, is occasionally found on the terminal buds of this oak.

On the young leaves are found examples of the spring form of the gall of *Andricus collaris*, Hartig, which was formerly known as *A. curvator*, Hartig.

A single example of the cherry gall, produced by *Dryophanta longiventris*, Hartig, was found on a leaf some years ago. The smaller leaf-gall, produced by *Dryophanta divisa*, Hartig, occurs sparingly on this oak.

Lastly, the marble gall, produced by *Cynips Kollari*, Hartig, is often abundant. Many of them are dwarfed, scarcely exceeding a pea in size, and often have an elongated or acuminate point. At first these were thought to be dwarfed by *Inquilines*, but the true maker was afterwards bred from them.

Quercus Cerris, *L.* The mossy-cupped oak, a native of South and Eastern Europe and Asia Minor. The only gall which I have found on this oak is the acorn-gall produced by *Callirhytis* (*Andricus*) *glandium*, Giraud. In the autumn some of the acorns are found to be dwarfed, protruding but little beyond the cup, and if these are examined the contents are found to be replaced by several small galls, each containing a larva of the insect.

Quercus lucombeana, *Loud.* The Lucombe oak, a hybrid between *Quercus Cerris*, L., and *Q. Suber*, Linn., the cork oak. The acorn galls of *Callirhytis* (*Andricus*) *glandium*, Giraud, are even more common on this species than on *Q. Cerris*, but although the gall occurs annually two or three attempts, by myself and others, to breed the insect proved unsuccessful. *See* Entomologist, xi., 204, 206 ; xiv., 57 ; and xvi., 31.

It may be interesting to indicate the botanical range of the galls which affect more than one species of oak, which are as follows :—

Biortiza aptera, *Bosc.*, occurs on *Q. pedunculata*, *Q. sessiliflora*, and *Q. lanuginosa*.

Andricus gemmae occurs on *Q. pedunculata* and *Q. Turneri*.

A. curvator, *Hartig*, occurs on *Q. pedunculata*, *Q. infectoria*, and *Q. Turneri*.

A. ostreus, *Giraud*, occurs on *Q. pedunculata*, *Q. sessiliflora*, and *Q. infectoria*.

Dryophanta divisa, *Hartig*, occurs on *Q. pedunculata*, *Q. sessiliflora*, and *Q. lusitanica*.

D. longiventris, *Hartig*, occurs on *Q. pedunculata* and *Q. Turneri*.

Neuroterus numismatis, *Oliv.*, occurs on *Q. pedunculata*, *Q. sessiliflora*, *Q. infectoria* and *Q. Turneri*.

N. baccarum, *L.*, occurs on *Q. pedunculata*, *Q. sessiliflora*, *Q. lanuginosa*, *Q. Toza*, *Q. conferta*, *Q. lusitanica*, *Q. infectoria*, *Q. dentata*, and *Q. Turneri*.

N. fumipennis, *Hartig*, occurs on *Q. pedunculata* and *Q. lusitanica*.

Cynips Kollari, *Hartig*, occurs on *Q. pedunculata*, *Q. sessiliflora*, *Q. lanuginosa*, *Q. Toza*, and *Q. Turneri*.

Callirhytis (Andricus) glandium, *Giraud*, occurs on *Q. Cerris* and *Q. lucombeana*.

It may be interesting to add that on these different species of oak each kind of gall retained its own distinctive character.

Two or three circumstances worthy of special mention came out during my observations. The first was the absence of the common spangle gall from the hybrid oak, *Quercus Turneri*, Loud., though the vernal form was common. The only possible explanation which occurs to me is that as the leaves become excessively hard as they approach maturity, somewhat resembling those of the *Q. Ilex* parent, the insect may find a difficulty in depositing its eggs. The suggestion is only made in default of a better one, and may not have much foundation in fact, for the gall of *N. numismatis* was abundant.

The second point of interest is that on *Quercus pedunculata* var. *granbyana* the common spangle gall is invariably of a deep blackish purple colour. It is true that a trace of similar colour appears in the young leaves of this oak, but the colour of the gall is far darker than would be expected from the colour of the foliage. The gall was also found on the yellow-leaved variety *concordia*, but here no difference of colour was observed.

The third curious point relates to the acorn galls, produced by *Callirhytis* (*Andricus*) *glandium*. These galls are abundant in certain years, and attempts have been made to breed the insects. but always without success. The curious thing is that the larvæ remain apparently healthy for several years in succession, but refuse to assume the perfect state. I have repeated the experiment with the same result. Mayr and Miss Ormerod have noticed the fact, and Mr. E. A. Fitch collected some in 1878 which were still living in 1881. Yet the gall appears annually, and as the eggs are presumably deposited in the young acorns, the insect probably emerges in early summer under natural conditions. It would be interesting to have the history of the species cleared up.

ARACHNIDA.

ARANEIDEA (Spiders).

By Rev. O. Pickard-Cambridge, M.A., F.R.S.

Considering the limited area of Kew Gardens, the following list of 134 species of spiders found in it seems a very fair result of the efforts devoted to this branch of Natural History by Mr. Nicholson. I feel very little doubt, however, that many more species would reward a collector who could give the requisite time and attention to looking up what we may call the *Micro-Araneidea*, that is, the numerous little species of the genera *Neriene* and *Walckenaera* of Blackwall. These, though represented by some interesting species in the present list, are yet in the main conspicuous by their absence. A large area is not needed to produce a long list of species. I may mention that there is a small fir plantation and rough heather enclosure of no more than two and a half acres in extent in my own district, where two of my sons, then small lads of 10

and 12 years old, collected in one season, 150 species. A considerable proportion of these were among the "*Micros.*" The late Mr. Tuffen West, when illustrating Mr. Blackwall's work on spiders, for the Ray Society, came to stay for a time with me, in order to make as many drawings as possible from living examples. In one of our collecting rambles, we came across a patch of moss and short heather, about four feet square, from which we bottled in the course of a couple of hours 40 species, several of them new to science. Of the Kew spiders, the larger number are of common species, but a reference to the list will show a fair sprinkling of rarities, and local forms. Two only appear to be new to science ; one (*Melos bicolor*) may possibly be an imported species, the other (*Microneta Nicholsonii*) is pretty certainly indigenous. The examination of the abundant materials sent to me by Mr. Nicholson has given me a great deal of pleasure and satisfaction ; may I venture to hope that someone still in the Gardens may take up the running where Mr. Nicholson has now been obliged to drop it ? I shall always be most glad to receive and work out whatever may be met with.—O. P.-Cambridge, October 23rd, 1902.

DYSDERIDAE.

Dysdera Cambridgii, *Thorell.* A. In outhouse—a local species. Only once collected.

D. crocota, *C. L. Koch.* B. In orchid-house, also in Cactus-house. P. Amongst grass roots at foot of wall of Old Palace.

Harpactes Hombergii, *Scop.* B. In curator's office. Q. Amongst grass in hedge bank facing Old Deer Park.

Segestria senoculata, *L.* Q. Under bark of trees, April, 1897.

Oonops pulcher, *Templet.* Q. Collected twice, November, 1897, November, 1899.

DRASSIDAE.

Drassus lapidosus, *Walck.* August, 1898, and June, 1899.

D. macer, *Thor.-Cambr.* An adult male in residence of Keeper of Herbarium, June, 1899.

D. cupreus, *Blackw.* P. Under bark of old plane, February, 1898. Also near Herbarium, amongst bushes, 1900.

D. Blackwallii, *Thorell.* Almost exclusively a house spider.

Prosthesima nigrita, *Fabr.* A. Amongst low bushes, adult female, June, 1899. A rather rare British spider.

P. Latreillii, *C. L. Koch.* Only found once, in house No. xviii., January, 1900.

Micaria pulicaria, *Sundeval.* Only collected once, July, 1898, on ground in herbaceous department.

Clubiona terrestris, *Westr.* Amongst grass roots and moss in all the divisions. A common species.

C. lutescens, *Westr.* In bushes in herbarium ground, adult males, April, 1899. In June, 1899, a specimen taken in residence of keeper of herbarium.

C. neglecta, *Cambr.* Once collected, herbaceous department, on the ground, April, 1899. This species has been found in other parts of England, but it is a rare spider ; it is met with in Germany as well as in France.

C. holosericea, *Degeer.* An abundant British spider in swampy situations among rushes, &c.

C. pallidula, *Clerck.* P. Under bark of old planes, chestnuts, &c., in winter—amongst bushes in summer. B. Rockery. Common.

C. diversa, *Cambr.* A. Once collected amongst juniper bushes, October, 1898. A rare species.

C. compta, *C. L. Koch.* A. B. P. Amongst gorse and other low-growing shrubs—a rather common Kew spider.

C. corticalis, *Walck.* A. Q. Common. Under bark of trees in winter, amongst grass and low bushes at other times.

Zora maculata, *Blackw.* October, 1898. Abundant ; in Britain, among débris of old hedges.

Agroeca inopina, *Cambr.* A. Amongst short grass round pagoda. Q. Along sunny hedge-bank, facing Old Deer Park. This species has previously been taken in two widely-separated localities, in Dorsetshire, and in South Wales, near Glamorgan.

Dictynidae.

Dictyna arundinacea, *L.* Amongst low bushes in all the divisions. A very abundant British spider.

D. uncinata, *Westr.* Amongst low bushes throughout the whole of the area ; common.

D. pusilla, *Westr.* A. Only collected once, June, 1899, amongst low juniper bushes. A rare spider.

D. variabilis, *C. L. Koch.* Once collected, September, 1899, in Pagoda Vista.

D. viridissima, *Walck.* An adult male, October, 1898, amongst juniper bushes ; an adult female under bark of horse-chestnut, near Grand Entrance, December, 1901. The only hitherto reported occurrence of this species in England was about twenty years ago on Box Hill, Surrey.

Lethia humilis, *Blackw.* Twice found—Q. April, 1899, amongst low bushes; A. June, 1899. A very abundant spider in the South of England.

Amaurobius ferox, *Walck.* Collected twice amongst decaying stumps south end of herbaceous ground, March and April, 1897, and twice in Q., February, 1899.

A. similis, *Blackw.* One of the commonest Kew spiders. In greenhouses, cartsheds, under stones and bark of trees.

A. fenestralis, *Stroem.* Temperate House and Temperate House pits, April, 1897. Not noted elsewhere in Kew. Chiefly a northern form.

AGELENIDAE.

Tegenaria parietina, *Fourcroy.* Old buildings, well of pumping station, &c. Probably the spider which has been inaccurately stated to be peculiar to Hampton Court, under the name of "The Cardinal." A tradition is said to exist that this spider terrified Cardinal Wolsey, and hence obtained its trivial name. The extent of the outstretched legs has exceeded four inches in Kew specimens.*

T. atrica, *C. L. Koch.* A common Kew spider. Found in hollow trees, outbuildings, cellars, &c., also in green-houses.

T. Derhamii, *Scop.* This is one of the commonest house-spiders of Europe.

T. silvestris, *C. L. Koch.* Q. Collected twice amongst old stumps. April, 1897. (This is the *T. campestris* of Cambridge in "Spiders of Dorset," &c.)

THERIDIIDAE.

Theridion vittatum, *C. L. Koch.* (*pulchellum*, Blackw. & Cambr.) Only once collected, amongst low bushes in rockery, June, 1898, but abundant in the South of England generally.

T. denticulatum, *Walck.* Much less abundant than *T. pictum*, but occurring under similar conditions. Collected three times in 1898–9, twice in rockery, once in arboretum.

T. simile, *C. L. Koch.* A. Amongst juniper, gorse, and other bushes, fairly common. A beautifully-coloured variety (adult males) found in juniper collection, May, 1898.

T. varians, *Hahn.* In all the divisions, amongst low bushes, &c., now and then in plant-houses.

T. tinctum, *Walck.* Always amongst low bushes or on the lower branches of taller trees—has been recorded from all the divisions.

T. pictum, *Hahn.* A very local spider, amongst low bushes in rockery and arboretum.

T. bimaculatum, *L.* A common Kew spider, generally found amongst herbage or low bushes.

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* An example in my collection has an expanse of nearly five and a half inches.—O.P.C.

T. pallens, *Blackw.* A minute species, noted in each division in bushes and amongst grass; forms a pretty little white egg-cocoon underneath the leaves of laurels and other shrubs.

Pholcomma gibbum, *Westr.* Once found in Herbarium grounds, 27th November, 1889, and generally a local and rather rare little spider.

Melos bicolor, *Cambr., Proc. Dorset Natural History and Antiquarian Field Club*, xx., 1899, i. f. 3. An immature male amongst herbage, in the hedgerow facing Old Deer Park, April, 1898. Although not adult, I had little hesitation in founding (*l.c.*) a new genus on this little spider. It is allied to *Euryopis* in some respects, but the large and very convex sternum, the form of the clypeus and armature of the legs, sufficiently distinguish it. It may possibly be an imported species.

Phyllonethis lineata, *Clerck.* An abundant Kew species.

Var. **redimitum**, *Clerck.* In upper nursery, July 22nd, 1897.

Steatoda bipunctata, *L.* A common house-spider, on windows, &c.

Crustulina guttata, *Wider.* P. Q. Amongst grass and old leaves.

Enoplognatha thoracica, *Hahn.* Q. Amongst grass and old leaves; adult male, April, 1898.

Tapinopa longidens, *Wider.* Found but once, amongst bushes near Old Palace, June 24th, 1898.

Stemonyphantes lineata, *L.* In each of the divisions, amongst herbage and on low bushes.

Linyphia insignis, *Blackw.* Found only once (an adult female), October, 1898, in open spot in Q.

L. montana, *Clerck.* Q. Amongst grass and old leaves.

L. triangularis, *Clerck.* Q. Amongst grass.

L. peltata, *Wider.* B. Q. Amongst low bushes, dead leaves, &c.

L. pusilla, *Sundeval.* In rockery, also along strip by towing-path.

L. hortensis, *Sundeval.* Q. Found once, April, 1898.

L. clathrata, *Sundeval.* A fairly abundant species amongst herbage.

Labulla thoracica, *Wider.* P. Has been found several times.

Leptyphantes minutus, *Blackw.* Amongst grass and old leaves in each of the divisions.

L. leprosus, *Ohl.* Q. Under bark of old stumps and in rotten wood, June, 1897. Only once found.

L. Blackwallii, *Kulcz.* Only once found, in herbarium grounds, May, 1899.

L. cristatus, *Menge.* Q. Amongst rotten leaves; only once found, December, 1897. A rather local British spider.

L. flavipes, *Blackw.* Q. Amongst rotten wood, June, 1897.

L. tenuis, *Blackw.* One of the commonest of the Kew spiders, amongst grass, leaves, &c.

L. nebulosus, *Sundeval.* Found once in Q. 29th April, 1899.

Bathyphantes circumspectus, *Blackw.* Q. Amongst bushes, November, 1898. B. Under dwarf conifers in rockery, December, 1898.

B. dorsalis, *Wider.* An abundant species in all the divisions.

Tmeticus rufus, *Wider.* A. Q. Under bark and on old stumps, collected three times.

T. abnormis, *Blackw.* Q. Collected only once, July, 1899.

T. bicolor, *Blackw.* A. Amongst grass roots at foot of pagoda, November, 1898, near filter-beds, December, 1898.

Microneta Nicholsonii, sp. n. Adult female, length 1 line. This species is of the ordinary form. *Cephalothorax*, clear bright yellow; *Legs*, particularly of the first and second pairs, moderately long and strong, 4., 1., 2., 3., and strongly tinged with orange; the *eyes* are closely grouped on black coalescent spots; the lateral pairs are on strong tubercles, those of the posterior row are equally separated by less than a diameter's interval; the hind-centrals are rather larger than the hind-laterals; and the slight curve of this row has its convexity directed backwards; the anterior row is straight or almost so. The height of the clypeus is equal to half that of the facial space, and is a little projecting below. The *palpi* are like the legs in colour and the cubital joint of each has a single long tapering prominent bristle from its fore side. The *maxillæ* and *sternum* are orange yellow. The *abdomen* is black, and the spinners pale yellow. The genital process is of characteristic form and structure, but is less prominent in profile than that of some other species. A single female in the collection found in June, 1899.

M. viaria, *Blackw.* Among low bushes in all the divisions. The usual habitat is among dead leaves and débris of all kinds.

M. rurestris, *C. L. Koch.* Common in all the divisions. One of the most abundant aeronautic spiders.

Sintula oblivia, *Cambr.* A. Amongst juniper bushes. October, 1898. Only once collected. A rare spider.

Maso Sundevallii, *Westr.* A. Q. Amongst gorse and other low growing shrubs.

Gongylidium graminicolum, *Blackw.* A. P. Q. On gorse and low bushes. Collected three times.

G. rufipes, *Sundeval.* P. Amongst low bushes. Once collected, May, 1899.

G. fuscum, *Blackw.* B. On bushes in rockery and amongst herbaceous plants. Collected once only, December, 1898.

G. dentatum, *Wider.* Q. On bushes, November, 1898. B. Amongst dead leaves of Asphodel, December, 1898.

Tiso vagans, *Blackw.* Q. Only collected once, April, 1899.

Erigone atra, *Blackw.* In all the divisions.

E. dentipalpis, *Wider.* A common Kew spider.

Neriene rubens, *Blackw.* P. Twice taken on gorse bush behind house No. I., August, 1899.

Dicyphus bituberculatus, *Wider.* Once taken in rockery, December, 1898.

Lophocarenum parallelum, *Wider.* Twice taken amongst low conifers in rockery, November, 1898 ; August, 1899.

Pocadicnemis pumilus, *Blackw.* A. P. Amongst low bushes. Three times collected in 1898–9.

Walckenaera acuminata, *Blackw.* A. B. P. Q. Has been collected some half-dozen times during the last four years, amongst dead leaves, &c.

Wideria antica, *Blackw.* Amongst dwarf plants in rockery, December 1898. Only twice collected.

Diplocephalus cristatus, *Blackw.* A. B. Twice collected in 1898 amongst grass and low shrubs.

Nesticus cellulanus, *Clerck.* September, 1898.

MIMETIDAE.

Ero thoracica, *Wider.* P. Has been collected several times.

EPEIRIDAE.

Pachygnatha Degeeri, *Sundeval.* A common Kew spider, abundant both in bushes and amongst herbage.

P. Clerckii, *Sundeval.* Q. Only found once, amongst moss and dead leaves, October, 1898.

P. Listeri, *Sundeval.* Q. Only found once, along hedge-bank facing Old Deer Park, April, 1898.

Tetragnatha Solandrii, *Scop.* An abundant British spider.

T. obtusa, *C. L. Koch.* A. Amongst low juniper, gorse and broom bushes—adults of both sexes collected June, 1898. A rare and local spider.

T. nigrita, *Lendl.* Found on various occasions.

Meta segmentata, *Clerck.* An abundant species.

M. Merianae, *Scop.* Q. This has only once been collected within our limits, April, 1899.

Cyclosa conica, *Menge.* B. Q. This species was captured twice in November, 1898, on tall-growing herbaceous plants.

Zilla x-notata, *Clerck.* An abundant species.

Z. atrica, *C. L. Koch.* Found once only, July 1898, in Q.

Epeira gibbosa, *Walck.* Collected once amongst bushes in rockery, June, 1898.

E. diademata, *Blackw.* An abundant Kew spider. This species is the one usually alluded to under the name of the "garden spider."

E. cucurbitina, *Clerck.* A common species in shrubberies and amongst tall herbaceous plants.

E. triguttata, *Fabr.* A. Amongst grass near winter garden, amongst low shrubs. Only twice collected.

E. umbratica, *Clerck.* An abundant spider; found chiefly under old bark on trees and posts, &c.

E. scolopetaria, *Clerck.* Lower nursery, on the ground, April, 1897. A local species, but often very abundant where it occurs.

E. cornuta, *Clerck.* B. Amongst dwarf bushes in rockery, June, 1899. A. In small shrubs, May, 1898.

E. patagiata, *Clerck.* A. Amongst gorse and broom bushes, August, 1899. Only once taken. A rare and local species.

THOMISIDAE.

Misumena vatia, *Clerck.* Q. On broom bush. Once taken.

Diaea dorsata, *Fabr.* Q. On bushes, November, 1898. Only once collected.

Xysticus cristatus, *Clerck.* A very common species, amongst herbage, low shrubs, &c.

Oxyptila atomaria, *Panz.* Q. On sunny bank of hedgerow facing Old Deer Park. Only once found, April, 1898.

Philodromus aureolus, *Clerck.* An abundant spider, affecting low herbaceous plants, bushes, &c.

PISAURIDAE.

Pisaura mirabilis, *Clerck.* P. Q. Amongst tall grass, dwarf bushes, &c.

Lycosidae.

Pirata piraticus, *Clerck.* A. Only twice taken, April and October, 1898.

Trochosa ruricola, *De Geer.* Only once collected, on the ground in herbaceous department, July, 1898.

T. terricola, *Thorell.* A. Nursery. Q. Amongst leaves, &c. A rather common species.

T. picta, *Hahn.* ♀ adult. A remarkably small and distinctly marked example. This is a local species and is chiefly found on sandy shores and heaths—probably introduced into Kew with peat or heather. Nursery, March, 1897.

Tarentula pulverulenta, *Clerck.* Q. Sunny hedgebank facing Old Deer Park. A. Short grass round base of Pagoda.

Lycosa amentata, *Clerck.* A common species in all the divisions —likes long grass and rough places.

L. annulata, *Thorell.* A. In open spots in wood. A local spider, but often abundant where it occurs.

L. nigriceps, *Thorell.* Q. In open spots in wood.

L. proxima, *C. L. Koch.* A. This species was collected whilst running on the bare ground in the lower nursery.

L. pullata, *Clerck.* A. Q. Amongst grass, in open places in wood, &c.

L. lugubris, *Walck.* Q. Amongst dead leaves in wood; common.

Salticidae.

Epiblemum scenicum, *Clerck.* Wherever there are sunny walls or fences within our limits this species may be found during bright sunshine.

E. cingulatum, *Panz.* This has only been twice taken, on wooden palings near pumping station, 1898.

Heliophanus flavipes, *C. L. Koch.* Only once has this species been met with in Kew—in May, 1899, amongst herbage close to the Queen's Cottage.

Euophrys frontalis, *Walck.* A. On grass, amongst low bushes in and near Juniper collection. P. Grassy slope.

Attus pubescens, *Fabr.* Wall of herbaceous ground, wall and roof of seed-shed.

Exotic Species.

Found under conditions and circumstances that show almost conclusively that they have been imported from abroad.

THERAPHOSIDAE.

☞ **Cyclosternum elegans,** *Sim.* Amongst living plants from Trinidad. Adult female.

DYSDERIDAE.

Oonops sp. ? Perhaps new. An adult male amongst living plants imported from Ceylon.

SCYTODIDAE.

Scytodes sp. ? An immature female amongst living plants from Fiji.

S. sp. ? An immature female amongst living plants from Penang.

DRASSIDAE.

Prosthesmia sp. ? An immature female in Wardian case from Penang.

DICTYNIDAE.

Gen. ? sp. ? ♀ Allied to *Amaurobius*, perhaps **Badumna,** *Thor.* In Wardian case from Sydney.

PHOLCIDAE.

Pholcus caudatus, *Desf.* In propagating pits. Almost certainly imported.

THERIDIIDAE.

Theridion tepidariorum, *C. L. Koch.* Abundant in greenhouses and other glass houses; has become so far naturalized that it is fairly considered to be a British spider, and is usually placed in British lists.

Theridion spp. ? Three species, doubtful, in Wardian cases from Ceylon.

T. luteipes, *Cambr.* In Wardian cases from Ceylon, and probably from Singapore.

THOMISIDAE (Subfam.: Heteropodinae).

Heteropoda regia, *Fabr.* In propagating pits. An almost cosmopolitan exotic spider: one likely to be imported in various merchandise.

SALTICIDAE.

Hasarius Adansonii, *Sav.* Frequent in plant houses and occasionally out of doors. Almost cosmopolitan, and is found in similar situations in many parts of England.

H. Paykullii, *Aud.* Amongst living plants from Singapore.

H. Nicholsonii, *Cambr.* Abundant in plant houses, where it particularly affects the folded leaves of Bromeliaceæ. In all probability introduced with Bromeliads from Brazil.

PHALANGIDEA (Harvestmen).

According to the "Monograph of the British Phalangidea or Harvestmen," by the Rev. O. Pickard-Cambridge, M.A., F.R.S., there are nine genera and 24 species in Britain. At Kew we have discovered up to the present 12 species representing five genera. All have been determined by Mr. Pickard-Cambridge.

Liobunum rotundum, *Latr.* Common amongst grass in the open, also in woods.

L. Blackwallii, *Meade.* Only collected once (1898), in Palace grounds.

Phalangium Opilio, *L.*

P. parietinum, *Degeer.* Only seen once, July, 1899, near Old Palace.

P. saxatile, *C. L. Koch.* Q. Once collected, July, 1899.

Platybunus corniger, *Herm.* Common amongst herbage and low bushes in all the divisions.

P. triangularis, *Herbst.* Amongst grass and leaves in Q.

Oligolophus morio, *Fabr.* Amongst grass, low bushes, and herbage in Q.

O. agrestis, *Meade.* Common in all the divisions.

O. ephippiatus, *C. L. Koch.* Collected only once in Kew, July, 1899.

O. spinosus, *Bosc.* One specimen was seen running over a visitor's coat in the Curator's office, in September, 1898. Another taken in Arboretum. A local and rare species.

Nemastoma lugubre, *O. F. Müller.* An abundant species amongst grass, moss, and dead leaves in Q.

ACARINA.

TROMBIDIIDAE (Harvest-mites).

Actineda sp.

TARSONEMIDAE.

Tarsonymus floricolus, *Canestrini & Fanzago.* On leaves of *Ceropegia Woodii* (see Kew Bull., 1895, 285–6).

T. Kirchneri, *Kramer* (= *T. buxi*, Canestrini & Berlesc.). On leaves of *Begonia*, *Cyclamen*, *&c.*

GAMASIDAE.

Gamasus coleoptratorum, *L.* Parasitic on the dung beetle.

Holotaspis montivagus, *Berlesc.* Parasitic on the dung beetle.

Laelaps sp. Parasitic on the dung beetle.

Lejus sp. Parasitic on *Rhizoglyphus echinopus* and *Histiostoma rostroserratum.*

HYDRACHNIDAE (Water-mites).

By Chas. D. Soar, F.R.M.S.

Several collections have been made during the present year in the waters of Kew Gardens for *Hydrachnidae*, but although a large number of specimens were taken, they represent only a small number of species. In the large ornamental pond in front of the Palm House only one species, *Atax crassipes*, Müll., was taken. The lily pond yielded several specimens, but the greater number were found in the large lake. I hope that the year 1903–4 will add considerably to the present small list. As most if not all of the Hydrachnids spend the larval stage as parasites for about a year, it is more than probable that the list will be largely extended.

Hygrobatinae.

Atax crassipes, *Müll.* Free swimming in lake near Palm House.

A. intermedius, *Koenike.* Parasitic in fresh-water mussel, common in large lake. This Hydrachnid can be found in all stages in the mussel.

Piona conglobatus, *Koch.* Found in large lake and lily pond.

P. rufa, *Koch.* Large lake.

Limnesia histrionica, *Hermann.* Common in large lake.

L. koenikei, *Piersig.* Lily-pond and large lake.

L. undulata, *Müll.* Lily pond.

Brachypoda versicolor, *Müll.* Common in large lake and lily pond.

Arrhenurus crassicaudatus, *Kram.* Large lake.

Hydryphantinae.

Diplodontus despiciens, *Müll.* Large lake, common.

Eulainae.

Eulais descreta, *Koenike.* Large lake.

Hydrachninae.

Hydrachna scutata, *Piersig.* Large lake.

ORIBATIDAE. (Beetle-Mites.)

Tegeocranus latus, *Koch.* Abundant on dead wood in autumn.

T. dentatus, *Michael.* Abundant on dead wood in autumn.

Damaeus geniculatus, (*C. L. Koch, ex Linn.*)

Hoploderma dasypus, *Dugés.*

TYROGLYPHIDAE.

Histiostoma rostro-serratum, *Mégnin.* An extremely abundant species very widely distributed ; it usually follows decay and is not a cause of it. Found swarming on decaying bulbs of *Lilium Hansoni.*

Rhizoglyphus echinopus, *Fumouse and Robin.* On fern fronds, &c.

SCORPIONIDAE.

PSEUDO-SCORPIONES.

Obisium muscorum.

Chthonius tetradactylus. Found inside the flower of *Asarum europaeum* in the rockery, June, 1900. This species has hitherto been known only from one or two localities in the South of Europe.

C. Rayi.

SCORPIONES.

Euscorpio carpathicus, *Koch.* A common South European and Algerian form.

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8. ANNELIDA.

OLIGOCHAETA.

The soils of Wardian cases furnish very favourable media for the transport of earthworms. It is therefore, not surprising that the following list contains many exotic species, twenty-one of which—those distinguished by an asterisk—were first described from specimens brought to Kew in this manner. For the identification of the species of this group we are indebted to Mr. F. E. Beddard, F.R.S., Prosector to the Zoological Society, and to Rev. H. Friend.

***Moniligaster bahamensis,** *Bedd.* Monogr. Oligoch., 196. Native of the Bahamas.

***Trichodrilus roseus,** *Bedd.* Proc. Zool. Soc., 1897.

Tubifex sp.

Branchiura sowerbii, *Bedd.* Monogr. Oligoch., 271. Habitat unknown.

Enchytraeus argenteus, *Michaelsen.* Bedd. Monogr. Oligoch., 340. Native of Germany (Elbe shore). Found in bulbs of *Fritillaria Meleagris.*

Fridericia hegemon, *Michaelsen.* Bedd. Monogr. Oligoch., 348. Native of Germany. Found in bulbs of *Fritillaria Meleagris.* New to Britain.

***Perichaeta sinensis,** *Bedd.* Monogr. Oligoch., 410. Native of China. Also found in a forcing house in the Berlin Botanic Gardens.

***P. dyeri,** *Bedd.* Monogr. Oligoch., 411. Native of Trinidad, Jamaica, and Lagos.

***P. Morrisi,** *Bedd.* Monogr. Oligoch., 411. Native of Penang.

***P. barbadensis,** *Bedd.* Monogr. Oligoch., 412. Native of Barbados.

***P. hesperidum,** *Bedd.* Monogr. Oligoch., 415. Native of Barbados.

***P. mauritiana,** *Bedd.* Monogr. Oligoch., 415. Native of Mauritius.

P. sumatrana, *Horst.* Bedd. Monogr. Oligoch., 422. Native of Sumatra, Hong Kong and Barbados.

P. posthuma. *Vaillant.* Bedd. Monogr. Oligoch., 424. Native of Celebes, Philippines, India and the Bahamas.

Typhaeus Nicholsoni, *Bedd.* Introduced from the Calcutta Botanic Gardens.

***Microdrilus saliens,** *Bedd.* Monogr. Oligoch., 506. Native of Java and Penang.

***Gordiodrilus tenuis**, *Bedd.* Monogr. Oligoch., 507. Native of West Tropical Africa.

***G. robustus**, *Bedd.* Monogr. Oligoch, 508. Native of Lagos.

***G. elegans**, *Bedd.* Monogr. Oligoch., 508. Native of Lagos.

***G. ditheca**, *Bedd.* Monogr. Oligoch., 509. Native of Lagos.

***G. dominicensis**, *Bedd.* Monogr. Oligoch., 509. Native of Dominica.

***Ocnerodrilus lacuum**, *Bedd.* Monogr. Oligoch., 515. Native of Lagos.

***Benhamia crassa**, *Bedd.* Monogr. Oligoch., 570. Native of Lagos.

***Eudriloides durbanensis**, *Bedd.* Monogr. Oligoch., 589. Native of Durban.

Eudrilus eugeniae, *Bedd.* Monogr. Oligoch., 604. Apparently introduced into many parts of the world. Found in the soil of a Wardian case from British Guiana.

***Hyperiodrilus africanus**, *Bedd.* Monogr. Oligoch., 618. Native of West Africa.

***Heliodrilus lagosensis**, *Bedd.* Monogr. Oligoch., 619. Native of Lagos.

Sparganophilus sp.

***Trichochaeta hesperidum**, *Bedd.* Monogr. Oligoch., 647. Native of Jamaica and Trinidad. Introduced from Jamaica.

***T. barbadensis**, *Bedd.* Monogr. Oligoch., 647. Native of Barbados.

***Ilyogenia africana**, *Bedd.* Monogr. Oligoch., 650. Native of Durban.

Pontoscolex corethrurus, *Horst.* Bedd. Monogr. Oligoch., 658. Widely distributed in the tropics of both hemispheres.

Allolobophora terrestris, *Bedd.* Monogr. Oligoch., 701. Native of Central and Western Europe.

A. foetida, *Eisen.* Bedd. Monogr. Oligoch., 702.

A. chlorotica, *Vejdovsky.* Bedd. Monogr. Oligoch., 703. Native of Europe, the Azores and Orient.

A. constricta, *Rosa.* Bedd. Monogr. Oligoch., 711. An Italian species, apparently not previously recorded in Britain. Found in rotten wood in Queen's Cottage grounds.

Lumbricus rubellus, *Hoffmeister.* Bedd. Monogr. Oligoch., 722. Widely distributed in north temperate regions, in Nicobar and in New Zealand.

L. herculeus, *Dugès.* Bedd. Monogr. Oligoch., 724. Widely distributed in the north temperate zone.

HIRUDINEA.

Hirudo medicinalis, *L.*

Glossiphonia sexoculata. Water-lily pond.

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9. PLATYHELMINTHES.

Turbellaria.

Bipalium Kewense. "Occasionally met with in hot-houses all over the world." *Shipley and Macbride*, "*Zoology*," 1901. 579.

Polycelis nigra. In the laboratory tank.

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10. ROTIFERA.

By Charles F. Rousselet, F.R.M.S.

The 120 species enumerated in the following list were obtained on various occasions during the years 1897–1902 from the ornamental waters of Kew mentioned below, and denoted in the list by the figures 1–5.

1. The large lake, about five acres in extent, is full of water-weeds of various kinds, and inhabited on the surface by ornamental water-fowl. At times Rotifers, particularly *Floscules*, were plentiful, also some free swimmers such as *Synchaeta tremula*, *S. oblonga* and *Polyarthra platyptera*. At other times the water was found remarkably clear and free from rotatorial life.

2. The pond, between museum No. 1. and the palm house, is inhabited by numerous aquatic birds, but totally free from water-weeds such as are so abundant in the lake. This was often found to contain vast numbers of *Asplanchna priodonta*, *Brachionus pala*, *Synchaeta pectinata*, *S. oblonga*, *Rotifer vulgaris*, and many other species. The rich bacterial and infusorial flora and fauna which apparently owe their existence to the excrement of the water-fowl, provide food material for the Rotifera.

3. The water-lily pond, near the extreme west end of the lake is a small shallow piece of water which has yielded rich gatherings occasionally.

4. The tank near the laboratory, devoted to the cultivation of out-door aquatic plants has been found very rich in species at times, and on one occasion, on October 8th, 1897, I obtained 40 different species of Rotifers from it.

5. The *Victoria Regia* tank has not yielded many Rotifers, but twice I found there the rather rare *Cephalosiphon limnias.* The water is kept at a temperature of about 85° Fahr.

No new species have so far been discovered, nor have I found any Rotifer of extreme rarity, but males of *Euchlanis oropha* and *E. triquetra* were obtained in No. 4 tank for the first time. Generally speaking the rotatorial fauna of the Gardens is fairly typical of that usually found round London.

The spring and the autumn, particularly October, seem to be the times when there is the greatest abundance and variety in species, though sometimes a species becomes very prolific in the summer months.

The Rotifera form a class of animals fairly cosmopolitan in their range, the same species, with very few exceptions, being found all over the world, when thoroughly searched for.

Nearly all the species here enumerated are figured and described in Hudson and Gosse's Monograph: *The Rotifera or Wheel-Animalcules* (London, 1886–89). Those to which references are added have been discovered since the publication of this standard work.

RHIZOTA.

Floscularia ornata, *Ehrenbg.* 1 and 4.

F. ambigua, *Hudson.* 1 and 4.

F. cornuta, *Dobie.* 1.

F. edentata, *Collins.* 1.

F. regalis, *Hudson.* 1.

F. annulata, *Hood; Science Gossip,* 1888, p. 8. 1.

Stephanoceros Eichhornii, *Ehrenbg.* 4.

Melicerta ringens, *Schrank.* 4.

M. tubicolaria, *Ehrenbg.* 1.

Limnias ceratophylli, *Schrank.* 2 and 5.

L. annulatus, *Weber, var.* **granulosus,** *Weber, Faune Rotatorienne du Bassin du Ciman,* 1898, p. 292. 4 and 5.

Cephalosiphon limnias *Ehrenbg.* 5.

Oecistes crystallinus, *Ehrenbg.* 1, 2, and 5.

O. intermedius, *Davis.* 4.

Lacinularia socialis, *Ehrenbg.* In the riverside ditch.

Conochilus unicornis, *Rousselet; Journ. Quekett Micr. Club,* iv. 1892, p. 367. 2.

BDELLOIDA.

Philodina megalotrocha, *Ehrenbg.* 1.

Rotifer megaceros, *Gosse.* 4.

R. vulgaris, *Schrank.* 1 and 4.

R. neptunius, *Ehrenbg.* 1.

R. macrurus, *Schrank.* 2 and 3.

PLOÏMA.

IL-LORICATA.

Asplanchna priodonta, ♂ & ♀. *Gosse.* Frequent in 1 and 2.

A. Brightwelli, *Gosse.* 2.

A. intermedia, *Hudson.* 3.

Synchaeta pectinata, *Ehrenbg.* 1, 2, 3, 4.

S. tremula, *Ehrenbg.* 1, 3, 4.

S. oblonga, *Ehrenbg.; Journ. Roy. Micr. Soc.* 1902, p. 284. 1, 3, 4.

S. stylata, *Wierzjewsky ; Rotatoria Galicyi*, 1892, p. 62. 1.

Ascomorpha helvetica, *Perty* (*Sacculus viridis*, Gosse). 2, 3, 4.

A. (Hertwigia) volvocina, *Plate.* Parasitic in *Volvox globator.* 3.

Triarthra longiseta, *Ehrenbg.* 1, 2 and 3.

T. breviseta, *Gosse.* 1.

T. mystacina, *Ehrenbg.* 1.

Polyarthra platyptera, *Ehrenbg.* Frequently occurring in 1, 2, 3 and 4.

P. aptera, *Hood ; Journ. Quekett Micr. Club*, v. 1893, p. 281. 1.

Rhinops vitrea, *Hudson.* 1.

Notops hyptopus, *Ehrenbg.* 3 and 4.

Copeus cerberus, *Gosse.* 3.

Taphrocampa annulosa, *Gosse.* 4.

Notommata torulosa, *Dujardin.* 1.

N. cyrtopus, *Gosse.* 1.

N. ansata, *Ehrenbg.* 4.

N. tripus, *Ehrenbg.* 4.

Proales decipiens, *Ehrenbg.* 4.

P. petromyzon, *Ehrenbg.* 1.

P. felis, *Ehrenbg.* 1.

Furcularia forficula, *Ehrenbg.* 1 and 4.

F. longiseta, *Ehrenbg.* 4.

Eosphora aurita, *Ehrenbg.* 1.

Diglena biraphis, *Gosse.* 1 and 4.

D. forcipata, *Ehrenbg.* 4.

D. catellina, *Ehrenbg.* 1 and 4.

D. ferox, *Western ; Journ. Quekett Micr. Club,* v. 1893, p. 155. 1.

LORICATA.

Mastigocerca bicornis, *Ehrenbg.* Frequent in 3 and 4.

M. elongata, *Gosse.* 3 and 4.

M. rattus, *Ehrenbg.* 1 and 4.

M. stylata, *Gosse.* 1 and 3.

M. carinata, *Ehrenbg.* 3.

Rattulus bicornis, *Western ; Journ. Quekett Micr. Club,* v. 1893, p. 155. 1.

Coelopus brachiurus, *Gosse.* Frequent in 4.

C. porcellus, *Gosse.* Frequent in 1 and 4.

C. tenuior, *Gosse.* 4.

Dinocharis tetractis, *Ehrenbg.* 4.

D. pocillum, *Ehrenbg.* Frequent in 1, 3 and 4.

Scaridium longicandum, *Ehrenbg.* 3 and 4.

Stephanops lamellaris, *Ehrenbg.* 1 and 4.

Salpina mucronata, *Ehrenbg.* 1.

S. spinigera, *Ehrenbg.* 4.

S. macracantha, *Gosse.* 4.

S. brevispina, *Ehrenbg.* 1.

Diaschiza gibba, *Ehrenbg. ; Journ. Roy. Micr. Soc.* 1903, p. 6. 1, 2 and 4.

D. caeca, *Gosse.*

D. globata, *Gosse ; Journ. Roy. Micr. Soc. l.c.* 4.

D. Hoodii, *Gosse ; Journ. Roy. Micr. Soc. l.c.* 4.

D. exigua, *Gosse ; Journ. Roy. Micr. Soc. l.c.* 1 and 2.

D. lacinulata, *Müller ; Journ. Roy. Micr. Soc. l.c.* 1, 2, 3 and 4.

D. gracilis, *Ehrenbg. ; Journ. Roy. Micr. Soc. l.c.* 4

D. sterea, *Gosse.* 1 and 4.

Diaschiza ventripes, *Nuttall; Journ. Quekett Micr. Club*, viii. 1901, p. 25. 4.

Euchlanis oropha, ♂ & ♀, *Gosse*. 1, 2, 3 and 4.

E. hyalina, *Hudson*. 3 and 4.

E. deflexa, ♂ & ♀, *Gosse*. 1 and 4.

E. triquetra, ♂ & ♀, *Ehrenbg*. 4.

Cathypna rusticula, *Gosse*. 1, 3 and 4.

C. luna, *Ehrenbg*. 1 and 4.

Distyla flexilis, *Gosse*. 1.

D. spinifera, *Western; Journ. Quekett Micr. Club*, v. 1894, p. 427. 1.

Monostyla cornuta, *Ehrenbg*. 4.

M. arcuata, *Bryce; Science Gossip*, 1891, p. 204. 1.

M. lunaris, *Ehrenbg*. 1.

M. quadridentata, *Ehrenbg*. 1.

Colurus leptus, *Gosse*. 1 and 4.

C. caudatus, *Ehrenbg*. 4.

Metopidia lepadella, *Ehrenbg*. 1, 2 and 4.

M. solidus, *Gosse*. 2 and 4.

M. acuminata, *Ehrenbg*. 1 and 3.

M. oxysternon, *Gosse*. 1.

Pterodina patina, *Ehrenbg*. 1 and 4.

Pompholyx sulcata, *Hudson*. 2.

Brachionus Bakeri, *Ehrenbg*. 1, 2 and 4.

B. urceolaris, *Ehrenbg*. 4.

B. quadratus, *Rousselet*. 2 and 4.

B. angularis, *Gosse*. Frequent in 1 and 2.

B. pala, *Ehrenbg*. 1, 2, 3 and 4.

B. rubens, *Ehrenbg*. 1.

B. dorcas, *Gosse*. 3.

Noteus quadricornis, *Ehrenbg*. 4.

Anuraea aculeata, *Ehrenbg*. Frequent in 1 and 2.

A. aculeata, *var.* **brevispina**, *Gosse*. Frequent in 3 and 4.

A. curvicornis, *Ehrenbg*. 4.

A. cochlearis, *Gosse*. Frequent in 1, 2 and 4.

Anuraea cochlearis, *var.* **stipitata,** *Ehrenbg.* 4.

A. hypelasma, *Gosse.* 1, 3 and 4.

A. serrulata, *Ehrenbg.* 4.

A. tecta, *Gosse.* 2.

Notholca acuminata, *Ehrenbg.* 4.

N. scapha, *Gosse.* Frequent in 1 and 2.

N. labis, *Gosse.* 1.

N. heptodon, *Perty.* 1.

Pedalion mirum, *Hudson.* 3.

11. PORIFERA.

DEMOSPONGIAE.

Ephydatia fluviatilis.

Spongilla fluviatilis. On Dreissensia shells in lake.

S. lacustris. Lake.

12. PROTOZOA.

CORTICATA.

Vorticella mic ostoma. Lake.

Paramoecium caudatum. Lake.

II.—FLORA.

1. PHANEROGAMS AND VASCULAR CRYPTOGAMS.

By G. Nicholson, F.L.S.

The following list of the flowering plants and higher cryptogams is founded on the one published in the "Journal of Botany," for January, 1875. Since that time a number of species has been added to the wild flora, and segregates have been duly determined. Some plants, such as *Lysimachia vulgaris*, *Typha angustifolia*, *Phragmites communis*, &c., have all the appearance of being truly wild at Kew, but are not in reality natives of the district, having been all planted within the memory of past or present members of the Kew staff. Of course, a considerable number of casuals may be noted at any season, but these are not included in the present flora. A very interesting feature connected with the wild flora of

Kew is the small proportion of naturalized exotics—particularly when the character of the locality is taken into account. No new alien has spread—and at the same time, held its own in competition with native plants—like *Claytonia perfoliata*, *Impatiens parviflora*, *Erigeron canadense*, *Galinsoga parviflora* and *Elodea canadensis*.

Owing to continual alterations, and to the higher cultivation which now obtains—in comparison with that of a score or more years ago—numbers of plants, which in certain localities were abundant then, are now rare or have perhaps disappeared altogether. Old gravel pits have been utilized ; the rose garden near the pagoda, and the bamboo garden near the rhododendron valley, now occupy sites, which for many years were waste ground furnishing many species. Localities, therefore, of many interesting plants have been perforce destroyed.

The Rubi have been determined by the Rev. W. Moyle Rogers and Mr. J. G. Baker. Some of the most common of the Surrey brambles do not occur within our limits. The roses are named in accordance with Mr. Baker's monograph, and the specimens have been seen and the names sanctioned by its author.

Ranunculus fluitans, *Lamb.* Lake and ha-ha.

R. circinatus, *Sibth.* Ha-ha.

R. sceleratus, *L.* A. By lake.

R. acris, *L.* Common.

R. repens, *L.* Common.

R. bulbosus, *L.* Common.

R. Ficaria, *L.* Plentiful in shady places.

Caltha palustris, *L.* Common along ha-ha, &c.

Eranthis hyemalis, *Salisb.* In turf in palace grounds, &c.

Nymphaea alba, *L.* In ha-ha bordering Q. Elsewhere planted.

Nuphar lutea, *Sm.* In ha-ha bordering Q. Elsewhere planted.

Papaver Rhæas, *L.* Here and there, not common.

Chelidonium majus, *L.* B. P. Abundant in latter division.

Var. **laciniatum.** B. P. Here and there with type.

Fumaria officinalis, *L.* Common in all the divisions.

Nasturtium officinale, *R. Br.* Strip. Here and there along ha-ha.

N. sylvestre, *R. Br.* A. Abundant near edge of lake. Strip. Here and there.

N. palustre, *DC.* A. About lake. Not so common as the last-named.

Nasturtium amphibium, *R. Br.* A. Here and there about lake. Strip.

Barbarea vulgaris, *R. Br.* A. About lake. Strip. Common.

B. stricta, *Andrz.* A. Near lake. Strip. Not uncommon.

Cardamine hirsuta, *L.* Moist shady places in all the divisions.

C. flexuosa, *With.* A. Most frequent near lake.

C. pratensis, *L.* Common in all the divisions.

Var. **dentata,** *Reichb.* (*C. dentata*, Schultz). P. Abundant in low ground between palace and herbarium.

C. amara, *L.* By ha-ha, abundant.

C. impatiens, *L.* A. An apetalous form grows abundantly under trees by the wall skirting Kew Road, opposite flagstaff.

Sisymbrium Thalianum, *J. Gay.* Common as weed in shrubberies, &c.

S. officinale, *Scop.* Common in all the divisions.

S. Alliaria, *Scop.* A. Ice house mound. P. Q. Here and there.

Erysimum cheiranthoides, *L.* A common weed in beds and edges of shrubberies. Strip. Common on towing path.

Brassica Rapa, *L.* Q. Strip. Many plants in both divisions.

Diplotaxis muralis, *DC.* Strip. On, and by the side of, the towing path.

Erophila vulgaris, *DC.* Extremely common on walks, in flower-beds, &c.

Camelina sativa, *Crantz.* A. Here and there in cultivated ground.

Capsella Bursa-Pastoris, *Medic.* Everywhere.

Senebiera didyma, *Pers.* Everywhere. A troublesome weed.

Lepidium ruderale, *L.* A. Here and there on dry ground, by walks, etc.

L. Smithii, *Hook.* A. Frequent all about lake, also in turf, near winter garden.

Thlaspi arvense, *L.* A. Here and there in cultivated ground.

Teesdalia nudicaulis, *R. Br.* A. On and near wall of ha-ha facing river.

Reseda Luteola, *L.* A. Formerly plentiful on all the ground bordering lake.

R. lutea, *L.* A. Here and there in waste places.

Viola odorata, *L.* P. Plentiful under trees near Brentford Ferry, also between palace and herbarium.

V. canina, *L.* A. Here and there in turf near pagoda, also on slopes near lake.

V. tricolor, *L.* B. A flower-bed weed.

V. arvensis, *Murr.* B. This occurs here and there with the former.

Polygala vulgaris, *L.* A. Here and there in turf on both sides of "Syon Vista."

Dianthus deltoides, *L.* A. In turf of pagoda vista, but does not flower on account of its being constantly mown down. In Larch collection does flower. Slopes of temperate house.

Silene Cucubalus, *Wibel.* A casual weed. Frequent about lake and elsewhere.

Var. **puberula**, *Hook. f.* A. In wood near pumping station.

Lychnis Flos-cuculi, *L.* B. Near Temple of Æolus. P. Near palace. Strip. By side of ha-ha.

L. diurna, *Sibth.* Q. Common in the woods.

L. vespertina, *Sibth.* Here and there in shrubberies and plantations.

L. Githago, *Lam.* Here and there as weed in plantations and flower-beds.

Cerastium glomeratum, *Thuill.* Abundant in dry places in all the divisions.

C. triviale, *Link.* Common in beds and shrubberies, also in turf.

C. arvense, *L.* A. Open dry places. In quantity on top of wall of ha-ha facing river.

Stellaria aquatica, *Scop.* Strip, near Isleworth gate.

S. media, *With.* Everywhere in beds, &c. Also in turf whenever it becomes rather bare.

Arenaria tenuifolia, *L.* A. On ground at top of wall of ha-ha facing river.

A. trinervia, *L.* In all the woods.

A. serpyllifolia, *L.* Everywhere.

Var. **leptoclados**, *Reichb.* Here and there.

Sagina apetala, *L.* Everywhere.

S. ciliata, *Fries.* A. Here and there as a weed on walks.

S. procumbens, *L.* Everywhere. Not unfrequent in dry places in turf.

Spergula arvensis, *L.* Two forms of this species occur *S. arvensis*, Bœnningh, and *S. sativa*, Bœnningh. The latter is the more abundant.

Spergularia rubra, *J. and C. Presl.* Everywhere. Walks and amongst turf in the dryer places.

Montia fontana, *L.* A. In the turf round temperate house; in turf and in beds at end of "Syon Vista."

Claytonia perfoliata, *Donn.* Not uncommon. A troublesome weed.

Hypericum perforatum, *L.* A. Common on wall facing river. P. Frequent in turf.

H. humifusum, *L.* Not uncommon in turf in dry places.

Malva sylvestris, *L.* Abundant.

M. rotundifolia, *L.* B. Here and there on most of the lawns. A. Now and then near the lake.

Malva moschata, *L.* P. A. About lake: also on the wood side of "Syon Vista."

Geranium pyrenaicum, *L.* P. Strip. Common.

G. molle, *L.* Everywhere, both in beds and turf.

G. pusillum, *L.* A. A few plants here and there about lake.

G. dissectum, *L.* A. A few plants. Q. Abundant, the whole length of the hedge-row facing Old Deer Park.

G. robertianum, *L.* The rarest species of geranium in the Kew flora. A. Merlin's Cave (now-destroyed), old ruined arch.

Erodium cicutarium, *L'Hérit.* B. In the lawn between No. 5 and museum No. 2. A. On the turf slopes near temperate house.

Oxalis Acetosella, *L.* Same localities as *Geranium robertianum.*

O. corniculata, *L.* A common flower-bed weed.

O. stricta, *L.* Here and there in shrubberies with last-named species.

Impatiens parviflora, *D. C.* A troublesome weed.

Ulex europæus, *L.* Before the lake was made its site was covered with this and *Cytisus scoparius.*

Cytisus scoparius, *Link.* Along border of wood, etc.

Ononis arvensis, *Auct.* Strip. Two plants by side of towing-path between Brentford and Isleworth gates.

Medicago sativa, *L.* Strip. In turf near Brentford Ferry.

M. lupulina, *L.* Common.

M. maculata, *Sibth.* Common everywhere within Kew limits.

Melilotus alba, *Desr.* A. A couple of large plants in the hollow between unicorn gate and flagstaff.

Trifolium subterraneum, *L.* Very frequent.

T. arvense, *L.* P. Common in dry gravelly spots.

T. pratense, *L.* Everywhere.

T. medium, *Huds.* A. Near temperate house. In wood near pumping station.

T. striatum, *L.* On wall of ha-ha. Amongst turf in dry spots.

T. hybridum, *L.* A. Near juniper collection. Q.

T. repens, *L.* A common component of the turf everywhere.

T. procumbens, *L.* A. Abundant in the dry gravelly soil near pagoda, and elsewhere.

T. dubium, *Sibth.* Generally diffused, common as a weed in flower-beds and on walks.

T. filiforme, *L.* On most of the lawns.

Lotus corniculatus, *L.* Abundant in all the divisions.

L. uliginosus, *Schkuhr.* A. Common round edge of lake, amongst *Juncus*, &c.

Ornithopus perpusillus, *L.* Everywhere. The turf behind King William's temple and near winter garden was almost entirely composed of this plant in 1873–4.

Vicia hirsuta, *S. F. Gray.* Common both in open turf and as a weed in beds and shrubberies.

V. Cracca, *L.* A. P. Q. Much less common than the preceding.

V. angustifolia, *Roth.* A. P. Q. Abundant.

Var. **Bobartii,** *Koch.* Sparingly, with the type.

Lathyrus pratensis, *L.* P. Q. Strip. Uncommon.

Spiræa Ulmaria, *L.* Common by ha-ha; elsewhere planted.

Rubus Idæus, *L.* A few clumps in Queen's Cottage grounds.

R. carpinifolius, *Weihe & Nees.* Q. "Form with exceptionally broad panicle and coarsely-toothed leaves." Rev. W. Moyle Rogers.

R. dumnoniensis, *Bab.* Q. Here and there.

R. pulcherrimus, *Neum.* Q. Abundant.

R. rusticanus, *E. Merc.* Strip. Here and there by towing-path.

R. macrophyllus, *Weihe & Nees.* Q. Abundant.

R. mucronatus, *Blox.* Q. Not uncommon along borders of plantations.

Rubus echinatus, *Lindl.* Q. "May perhaps be a shade form of this species, but if so, very much off type." Rev. W. Moyle Rogers.

R. rudis, *Weihe & Nees.* Q. In open places, not uncommon.

R. podophyllus, *P. J. Muell.* Q. [Or form between it and *R. oigocladus*, P. J. Muell. & Lefv.] Rev. W. Moyle Rogers.

R. foliosus, *Weihe & Nees.* Q. Common in shade.

R. rosaceus, *Weihe & Nees*, var. **hystrix**, *Moyle Rogers.* Q. Very common in shady places.

R. cæsius, *L.* Strip. On side of towing-path.

Geum urbanum, *L.* B. A flower-bed weed. A. Here and there in shrubberies. Strip. By towing-path.

Potentilla procumbens, *Sibth.* Common, except in division B.

P. reptans, *L.* Everywhere. Frequent in the open turf, particularly about wood and lake.

P. anserina, *L.* B. A weed in shrubberies. Strip. Common.

P. Fragariastrum, *Ehrh.* Common in turf near palace.

P. argentea, *L.* Pagoda vista, near temperate house. Strip.

Alchemilla arvensis, *Scop.* P. A. B. Common where turf is poor. Strip. Abundant on towing-path.

Agrimonia Eupatoria, *L.* Uncommon. A few plants in each division.

Poterium Sanguisorba, *L.* Strip. A few score tufts in the turf midway between Brentford and Isleworth Gates.

Rosa canina, *L.* In the Queen's Cottage grounds the following forms occur in a wild state.

R. lutetiana, *Leman.*

R. surculosa, *Woods.*

R. spherica, *Gren.*

R. dumalis, *Bechst.*

R. obtusifolia, *Desv.*

R. kosinsciana, *Bess.*

R. cæsia, *Sm.*

Saxifraga tridactylites, *L.* On old wall near Herbarium. A. On wall of ha-ha.

S. granulata, *L.* So common as to give, when in flower, quite a colour to the whole river length of the area.

Sedum acre, *L.* On the wall and in the turf near it, the whole length of the river boundary. Strip. Here and there along towing-path.

Myriophyllum spicatum, *L.* A. Lake. Strip. Common the whole length of ha-ha.

Callitriche verna, *L.* Strip. Frequent in the ha-ha.

Lythrum Salicaria, *L.* Strip. Common along the ha-ha.

Peplis Portula, *L.* A. Frequent along edge of lake.

Epilobium angustifolium, *L.* Q. Elsewhere planted.

E. hirsutum, *L.* A. About lake. Strip. Very common.

E. parviflorum, *Schreb.* A. Here and there. Abundant years ago on site now occupied by bamboo garden.

E. montanum, *L.* Common everywhere.

E. tetragonum, *L.* Common as weed in shrubberies, &c.

E. obscurum, *Schreb.* Here and there with last-named species.

Œnothera biennis, *L.* This formerly occured in waste-places in arboretum.

Circæa lutetiana, *L.* A. Formerly in wood about "Merlin's Cave."

Bryonia dioica, *L.* A few plants near the Queen's Cottage.

Hydrocotyle vulgaris, *L.* A. Round edges of lake.

Apium nodiflorum, *Reichb.* Strip. Abundant near river.

Ægopodium Podagraria, *L.* In all the divisions.

Pimpinella Saxifraga, *L.* Strip. Plentiful in turf bordering towing-path.

Conopodium denudatum, *Koch.* A. Common in the woods.

Chærophyllum temulum, *L.* A few plants in Queen's Cottage grounds.

Anthriscus sylvestris, *Hoffm.* Abundant in all the divisions.

Œnanthe crocata, *L.* A. Round lake. Strip. Abundant the whole length of the river boundary.

Æthusa Cynapium, *L.* A flower-bed weed. Everywhere in cultivated ground.

Angelica sylvestris, *L.* Strip. Rather frequent.

Heracleum Sphondylium, *L.* Fairly common in all divisions except B.

Daucus Carota, *L.* A. A few plants on the north and south slopes near lake.

Caucalis Anthriscus, *Huds.* Strip. Plentiful along towing-path. Here and there in Queen's Cottage grounds, &c.

Hedera Helix, *L.* Frequent. An undoubted member of the Kew flora.

Galium verum, *L.* Common in the dry open turf.

G. Cruciata, *Scop.* Strip. A large patch on towing-path on the Richmond side of Isleworth Gate.

G. palustre, *L.* Strip. A few plants of the typical form occur here and there by ha-ha.

G. saxatile, *L.* Very common in the turf almost everywhere.

G. Mollugo, *L.* P. Several plants along top of wall by Brentford gate. Q. Here and there on portion nearest river.

G. Aparine, *L.* P. & Q. Not uncommon in open shrubberies.

Sherardia arvensis, *L.* Here and there on most of the lawns. A. Common about lake and elsewhere.

Valeriana officinalis, *L.*, var. **sambucifolia**, *H. C. Wats.* Common in the Strip—the type form not noted as seen within our present limits.

Centranthus ruber, *DC.* P. On wall between Brentford Gate and entrance to Kew Palace.

Valerianella olitoria, *Pollich.* P. Wall facing river. Strip. Near towing-path.

V. carinata, *Loisel.* Here and there with the last, but not so common.

Dipsacus sylvestris, *L.* Strip. By towing-path near Isleworth Gate.

Erigeron canadense, *L.* A. B. P. Q. A common weed in shrubberies, &c.

Bellis perennis, *L.* Everywhere.

Pulicaria dysenterica, *Gærtn.* Strip. Frequent along ha-ha.

Gnaphalium sylvaticum, *L.* A. Frequent in turf in Birch collection.

G. uliginosum, *L.* In all the divisions. Plentiful both on waste and cultivated ground.

Filago germanica, *L.* A weed in shrubberies and bare gravelly spots.

F. minima, *Fries.* Common in all the very dry places. In some places where turf gets badly worn, a plentiful crop of this species appears.

Bidens cernua, *L.* A. Common about lake. Strip.

B. tripartita, *L.* Growing with the last-named, but more abundant.

Galinsoga parviflora, *Cav.* A troublesome weed in well-cultivated ground.

Anthemis arvensis, *L.* A. A few plants about lake.

A. nobilis, *L.* B. Common as a component of the turf in various lawns.

Achillea Millefolium, *L.* Everywhere. A common factor of the open turf.

Matricaria Chamomilla, *L.* A common weed.

***M. discoidea,** *DC.* Not uncommon in some localities within our area.

M. inodora, *L.* A weed in flower borders and shrubberies.

Chrysanthemum Leucanthemum, *L.* Very common in the turf; common also in cultivated ground.

C. Parthenium, *Pers.* A weed in flower beds and shrubberies.

Tanacetum vulgare, *L.* Strip. Here and there near ha-ha and river.

Artemisia vulgaris, *L.* Strip. By towing-path. Q. Here and there.

Petasites vulgaris, *L.* Strip. Very common on the river side of towing-path.

Tussilago Farfara, *L.* A. About lake and near pumping station.

Senecio vulgaris, *L.* Common.

S. sylvaticus, *L.* More abundant about lake and along borders of woods than the preceding.

S. Jacobaea, *L.* A. P. Q. Here and there in open places and less shady parts of woods. Strip. Much less frequent than *S. aquaticus.*

S. aquaticus, *Huds.* A. Here and there near lake. Strip. Common.

Arctium majus, *Schkuhr.* P. A. A few plants in wood near hollow walk. Strip.

A. minus, *Schkuhr.* Q. Common. Strip. Common by towing-path.

Centaurea nigra, *L.* In all the divisions. Most common in P. and Q.

C. Jacea, *L.* A few plants near lake and in Queen's Cottage Grounds.

C. Scabiosa, *L.* P. Here and there. Strip. A few plants.

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* This plant, apparently a native of North Asia and North-west America, was collected on the bank of the Thames in 1869 by Dr. Thomson, and is now common in some localities within our area. It is a widely distributed weed in temperate climates. A history of its distribution and its extraordinary synonymy—it has received altogether no less than ten different generic names — is given by A. Braun in the Botanische Zeitung for 1852, p. 649.

Carduus nutans, *L.* P. In young plantations facing river. Strip.

C. crispus, *L.* P. A. Here and there borders of wood. Q.

Cnicus lanceolatus, *Hoffm.* Not common. A few plants in each division.

C. palustris, *Hoffm.* Here and there along borders of shrubberies in Queen's Cottage Grounds.

C. arvensis, *Hoffm.* Q. Common in the turf of the open vista nearest river.

Cichorium Intybus, *L.* Strip. A few plants along the gravelly sides of towing-path.

Lapsana communis, *L.* B. A flower-bed weed. P. A. Q. Here and there in shrubberies.

Crepis virens, *L.* One of the most common of Kew composites.

C. taraxacifolia, *Thuill.* Q. In the open vista near river.

Hieracium Pilosella, *L.* Common on every dry slope within our limits.

H. vulgatum, *Fries.* P. A few plants. A. A large plot in wood near pumping station.

Var. **maculatum**, *F. J. Hanb.* P. A. With the type. B. As a weed in rockery.

Hypochæris radicata, *L.* Everywhere. A very troublesome weed.

Leontodon hirtus, *L.* Common, particularly in drier parts of divisions P. and Q.

L. hispidus, *L.* A. In turf near south end of temperate house. Q.

L. autumnalis, *L.* P. and Q. Sparingly.

Taraxacum officinale, *Weber.* Common, everywhere.

Lactuca muralis, *E. Mey.* B. On hardy fernery wall, &c.

Sonchus arvensis, *L.* A., B., and P. Here and there in shrubberies. A few plants grow out of wall facing river.

S. oleraceus, *L.* Fairly common everywhere, though not so frequent as *S. asper.*

S. asper, *Hoffm.* Here and there on every piece of dug ground.

Tragopogon pratensis, *L.*, var. **minor**, *Billot.* Q. and Strip; not uncommon.

Jasione montana, *L.* A. Common in turf and shrubberies from temperate house to pagoda. In 1873 albino form noted.

Campanula rotundifolia, *L.* A. Not uncommon in turf near Ash collections and elsewhere.

Campanula rapunculoides, *L.* P. Here and there in turf.

C. glomerata, *L.* P. In hay grass near palace.

Calluna vulgaris, *Salisb.* A. Here and there in open places. Q. Common in the open turf near Queen's Cottage.

Primula vulgaris, *Huds.* A few plants in turf in herbarium grounds.

P. veris, *L.* In company with the last, but more common.

Lysimachia vulgaris, *L.* This has been planted wherever it occurs within our limits.

L. Nummularia, *L.* Frequent in damp spots in herbarium and palace grounds. Strip. Near Isleworth Gate.

Anagallis arvensis, *L.* B. On soil heaps and in flower-beds. A. Common about lake.

Erythraea Centaurium, *Pers.* A. Two or three plants near lake, 1873-4. P. About a score plants.

Symphytum officinale, *L.* Strip. Not uncommon.

Lycopsis arvensis, *L.* Here and there on waste ground.

Myosotis palustris, *With.* Here and there by lake. Strip. Rather frequent by ha-ha.

M. arvensis, *Hoffm.* A. B. P. Common in bare places in turf about lake, also in beds.

M. collina, *Hoffm.* Strip. On wall of ha-ha near river. In turf in dry gravelly places.

M. versicolor, *Reichb.* In company with last-named ; also abundant in dry places near pagoda, where the smaller-flowered yellow form, *M. balbisiana*, Jord., was first recognized as a British plant.

Convolvulus arvensis, *L.* A. Common on slopes and elsewhere about temperate house.

Calystegia sepium, *R. Br.* Here and there as a weed in shrubberies.

Cuscuta Epithymum, *Murr.* B. On ivy behind palm house. In 1873 in flower borders, on Alternanthera, Mesembryanthemum, Gladiolus, Pentstemon, &c.

Solanum Dulcamara, *L.* Q. Common in shrubberies and wood A very pubescent form occurs on Strip.

S. nigrum, *L.* Abundant. Often appears where turf has become bare.

Plantago major, *L.* Common in all the divisions.

P. media, *L.* Almost as common as the last in many places.

P. lanceolata, *L.* Everywhere.

Plantago Coronopus, *L.* Common in every dry place. Strip. Very abundant on the top of ridge by the side of towing-path.

Verbascum Thapsus, *L.* P. Near Brentford Ferry Gate. A. Here and there on border of wood.

V. nigrum, *L.* P. and Q. Abundant. A. Along border of wood.

Linaria Cymbalaria, *Mill.* Very common on walls and in dry places.

L. vulgaris, *Mill.* Here and there as a weed in shrubberies.

L. minor, *Desf.* Here and there as a weed in shrubberies and flower-borders.

Scrophularia nodosa, *L.* Strip. Common along ha-ha and by river.

S. Balbisii, *Hornem.* Strip. Here and there by river and ha-ha.

S. vernalis, *L.* B. Frequent on ice-house mound. Destroyed elsewhere owing to alterations.

Digitalis purpurea, *L.* A. Q. In woods and along shrubbery borders.

Veronica agrestis, *L.* Common in all the divisions.

V. polita, *Fries.* Flower-beds and borders of shrubberies in company with V. Buxbaumii, but not so common as that species.

V. Buxbaumii, *Tenore.* The commonest species in the Kew flora. (*V. persica*, Poir.)

V. hederaefolia, *L.* Common in shrubberies.

V. arvensis, *L.* Common in all the divisions.

V. serpyllifolia, *L.* Frequent on every piece of lawn.

V. officinalis, *L.* Fairly common everywhere.

V. Chamaedrys, *L.* A. Q. Not unfrequent.

V. Anagallis, *L.* Strip. By ha-ha and river.

Euphrasia officinalis, *L.* Q. A few plants in turf near Isleworth Gate. Not noted since 1873.

Lathraea Squamaria, *L.* B. In Rhododendron bed on mound near Cumberland Walk, and elsewhere. Introduced from Dorking about 1834. (*See* Jour. Bot., 1872, 173.)

Verbena officinalis, *L.* P. Q. and Strip. Here and there.

Mentha sylvestris, *L.* Strip. A large patch or two near Brentford Ferry Gate.

M. hirsuta, *L.* Abundant round lake and along Strip.

Lycopus europaeus, *L.* Abundant about pond, lake, and along Strip.

Thymus Chamaedrys, *Fries.* Common in every dry piece of turf within the limits of our flora. Strip. Frequent on wall facing river.

Nepeta Cataria, *L.* A. A few plants near temperate house.

N. Glechoma, *Benth.* Common under trees and in shrubberies.

Prunella vulgaris, *L.* Here and there in turf in all the divisions.

Scutellaria galericulata, *L.* Strip. Plentiful by ha-ha near Isleworth Gate.

Stachys sylvatica, *L.* A. Here and there in wood. Q. Not uncommon.

S. palustris, *L.* Strip. A few plants by ha-ha near Isleworth Gate.

Lamium purpureum, *L.* Common in all the divisions.

L. amplexicaule, *L.* Strip. In turf by towing-path near Brentford Ferry.

L. album, *L.* Strip. Very frequent. Less common in other divisions.

Ballota nigra, *L.*, var. **fœtida,** *Koch.* Strip. By towing-path. Q. Not uncommon.

Teucrium Scorodonia, *L.* A. About "ruined arch." Here and there in wood.

Ajuga reptans, *L.* Here and there on most of the lawns.

Chenopodium polyspermum, *L.* Not uncommon as a weed in cultivated ground.

C. album, *L.* Common everywhere.

C. murale, *L.* A. Here and there in dry places.

Atriplex erecta, *Huds.* Here and there in all the divisions.

A. Smithii, *Syme.* In company with the next-named.

A. deltoidea, *Bab.* Common on rubbish heaps and in bare places.

Polygonum amphibium, *L.* Strip. In ha-ha.

P. lapathifolium, *L.* Fairly common in all the divisions.

P. maculatum, *Trimen & Dyer.* Here and there with the preceding.

P. Persicaria, *L.* Common everywhere.

P. Hydropiper, *L.* A. Here and there along edge of lake. Strip. Very abundant by ha-ha and river.

P. minus, *Huds.* A. Common about lake, &c.

P. aviculare, *L.* Common in bare places everywhere.

P. Convolvulus, *L.* Here and there in all the divisions.

Rumex obtusifolius, *L.* Here and there in shrubberies and along border of wood whole length of Syon Vista.

Rumex pulcher, *L.* P. Here and there in dry places.

R. crispus, *L.* Borders of shrubberies, &c.

R. sanguineus, *L.* Here and there in dry places.

R. conglomeratus, *Murr.* A. Very common about lake and near river.

R. Hydrolapathum, *Huds.* A. Here and there round lake. Strip. Not uncommon.

R. Acetosa, *L.* Fairly common in each division.

R. acetosella, *L.* Very common everywhere.

Viscum album, *L.* This occurs at present on poplar aud lime in P. and A.

Euphorbia Helioscopia, *L.* Here and there in cultivated ground.

E. Peplus, *L.* Very common everywhere.

Mercurialis perennis, *L.* A. Here and there in wood.

M. annua, *L.* Common as weed in cultivated ground.

Urtica urens, *L.* Frequent wherever the soil gets turned.

U. dioica, *L.* Common in the woods.

Parietaria officinalis, *L.* Old walls. Strip. Side of towing-path.

Salix triandra, *L.* Strip. Common by towing-path and river.

S. undulata, *Ehrh.* Strip. The prevailing willow of the Thames banks within our limits.

S. fragilis, *L.* Strip. Not uncommon by towing-path and river.

[There are several other species by ha-ha, but all of them have been planted quite recently.]

Ceratophyllum demersum, *L.* A. Lake. Strip. Plentiful in ha-ha, nearly its whole boundary length of gardens.

Hydrocharis Morsus-Ranae, *L.* Strip. In ha-ha nearly the whole length of Queen's Cottage Grounds.

Elodea canadensis, *Michx.* Abundant in every piece of water within our limits, except the pond, near Palm House—about 40 years ago, however, this particular sheet of water was choked up with Elodea.

Epipactis latifolia, *All.* Until within the last year or so this species throve under a large beech tree near Victoria Gate; the death of the tree and its consequent removal have resulted in the destruction of the Epipactis.

Orchis Morio, *L.* A. B. Q. A plant or two in each of the divisions named.

Iris Pseudacorus, *L.* Lake and ha-ha.

Tamus communis, *L.* A. A few plants near Pagoda. Q. Several plants.

Allium vineale, *L.* Strip. Common in turf by towing-path.

A. roseum, *L.* Abundant in turf near Old Palace.

Scilla nutans, *Sm.* A. P. Q. Very abundant in all the woods.

Ornithogalum umbellatum, *L.* Strip. By side of towing-path near Isleworth Gate. P. Near Palace in hay grass.

O. nutans, *L.* P. In quantity in hay grass near Old Palace.

Juncus effusus, *L.* A. Lake. Stunted forms of this and *J. glaucus* are not uncommon in some parts of the woods.

J. conglomeratus, *L.* A. Common about lake.

J. glaucus, *Ehrh.* A. Common about lake.

J. squarrosus, *L.* About a score plants in wood between temperate house and pumping station.

J. lamprocarpus, *Ehrh.* A. Plentiful round lake.

J. bufonius, *L.* A. Abundant about lake.

Luzula maxima, *DC.* Here and there in Queen's Cottage Grounds.

L. campestris, *DC.* Fairly common in every piece of turf.

[**L. nivea**, *Desv.* A considerable number of plants in Queen's Cottage Grounds.]

Sparganium ramosum, *Huds.* Strip. Really wild about ha-ha; planted elsewhere.

Typha latifolia, *L.* A. Lake. Strip. Side of ha-ha.

[**T. angustifolia**, *L.* This has been planted wherever it occurs in our flora.]

Arum maculatum, *L.* B. Ice-house mound. A. Under trees along wall between Unicorn Gate and North Gallery. Q. Here and there.

Acorus Calamus, *L.* Plentiful about lake, pond, and ha-ha.

Lemna minor, *L.* Common in lake and ha-ha.

L. gibba, *L.* Grows with the preceding and the following species, but uncommon.

L. polyrhiza, *L.* Lake and ha-ha, abundant.

Alisma Plantago, *L.* Common about lake and near ha-ha.

Butomus umbellatus, *L.* Strip. Common along edge of ha-ha.

Potamogeton crispus, *L.* Lake and ha-ha.

P. densus, *L.* Strip. Common in ha-ha.

P. pusillus, *L.* A. Lake, water-lily pond.

Heleocharis palustris, *L.* Very common about lake and along ha-ha.

Scirpus lacustris, *L.* Strip. Large masses on banks of mud by river.

S. carinatus, *Sm.* Strip. Side of river opposite Palace Grounds.

S. triqueter, *L.* Strip. Side of river opposite Palace Grounds; also south of Brentford Ferry.

Carex muricata, *L.* B. P. A. Here and there in dry places.

C. vulpina, *L.* A. Here and there by lake. Strip. Not uncommon.

C. remota, *L.* Strip. By ha-ha and along towing-path near Isleworth Gate.

C. leporina, *L.* A. Near lake. Q. Not unfrequent. Strip. By ha-ha.

C. acuta, *L.* Strip. This and *C. paludosa* are rather rare within our limits.

C. hirta, *L.* Strip. Common. Q. Abundant along a strip of about 50 yards broad from wall of ha-ha.

C. paludosa, *Good.* Strip. Here and there by ha-ha.

C. riparia, *Curtis.* Common, nearly all pieces of water.

Phalaris arundinacea, *L.* A. Near lake. Strip. Abundant along ha-ha.

Anthoxanthum odoratum, *L.* Common in all the divisions.

Alopecurus agrestis, *L.* Here and there in cultivated ground.

A. pratensis, *L.* Common. In some places forming the principal factor in the turf.

Milium effusum, *L.* Q. Plentiful in wood skirting pinetum.

Phleum pratense, *L.* Generally distributed over the whole of the open turf.

Agrostis vulgaris, *With.* Abundant in all divisions.

Agrostis alba, *L.* A. About lake and on borders of plantations.

Apera Spica-venti, *Beauv.* B. A weed in cultivated ground.

Aira caryophyllea, *L.* Plentiful in dry spots—along hedgerows, &c.

A. praecox, *L.* In every dry place both in turf and elsewhere.

Deschampsia flexuosa, *Trin.* A. Q. Affects shade more than the following species. Common under trees.

D. caespitosa, *Beauv.* A. Q. and Strip. Very common about lake and on the borders of plantations nearest it; also near ha-ha.

Holcus lanatus, *L.* Plentiful in all the divisions.

Holcus mollis, *L.* Common both in turf and shrubberies.

Trisetum flavescens, *Beauv.* Common in every piece of turf within our limits.

Avena pratensis, *L.* A. Frequent in turf from flagstaff to pagoda. P. Not uncommon. Q. In turf on side bordering river.

A. pubescens, *L.* Same distribution as last, but much commoner.

Arrhenatherum avenaceum, *Beauv.* Everywhere forms a large proportion of the rougher turf. A troublesome weed in dug ground.

Triodia decumbens, *Beauv.* Common on both sides of Syon Vista towards river. Very common in turf between Unicorn Gate and Pagoda Vista.

Cynosurus cristatus, *L.* Common everywhere. Forms a fair share of most of the turf.

Koeleria cristata, *Pers.* Very frequent in open turf.

Molinia cærulea, *Moench.* A. Here and there by lake; also in wood near pumping station.

Dactylis glomerata, *L.* Very generally diffused over the whole of the ground included within the limits of the flora.

Briza media, *L.* P. Frequent in turf near palace. A. Common at northern part of Ash collection. Q. Here and there.

Poa annua, *L.* A large proportion of nearly every piece of turf is made up of this plant.

P. pratensis, *L.* Common in all the divisions.

P. compressa, *L.* A. Here and there on dry slopes near winter garden and in dry spots in wood. P. On wall of herbarium and palace grounds.

P. trivialis, *L.* Not so frequent as *P. pratensis.*

P. nemoralis, *L.* Abundant under trees in all the divisions, in some places forming nearly the whole of the turf.

P. sylvatica, *Chaix.* A. and Q. In shady parts of woods the long dark green leaves and dense tussocks of this grass render it very conspicuous. It seems to stand drought much better than many of our British grasses. (*P. sudetica*, Hœnke.)

Glyceria aquatica, *Sm.* Strip. Abundant by ha-ha.

G. fluitans, *R. Br.* Lake and Strip. Common.

Festuca elatior, *L.* A. Here and there. Strip. By towing-path. Q. Sparingly.

F. pratensis, *Huds.* Same distribution as last.

F. gigantea, *Vill.* Strip. Uncommon. Q. Here and there.

Festuca ovina, *L.* In dry gravelly spots this is the principal factor in the turf.

Var. **tenuifolia,** *Reichb.* Very common.

F. duriuscula, *L.* Common.

F. sciuroides, *Roth.* A. In dry beds and turf near Isleworth Gate.

Bromus erectus, *Huds.* P. In hay-grass. Strip and Q. Not uncommon.

B. sterilis, *L.* Common.

B. commutatus, *Schrad.* P. Hay-grass near palace.

B. mollis, *L.* Everywhere.

Brachypodium sylvaticum, *Beauv.* A. In turf by the river. Strip. Frequent.

Lolium perenne, *L.* Very common.

L. italicum, *A. Braun.* In all the divisions.

Agropyrum repens, *Beauv.* The principal ingredient in the turf in some spots in arboretum, &c.

Nardus stricta, *L.* A. Both sides of Syon Vista : near south end of holly collection. Q. Here and there.

Hordeum murinum, *L.* Strip. Abundant. P. About palace.

Pteris aquilina, *L.* A. Here and there in wood. Q. Common.

Nephrodium Filix-mas, *Rich.*, var. **affine,** *Hook.* A. Here and there in wood near pumping station. Q. Common.

N. spinulosum, *Desv.* Common in Queen's Cottage Grounds.

Ophioglossum vulgatum, *L.* A. In open place in wood near Azalea garden.

Equisetum arvense, *L.* Here and there in shrubberies. Not frequent.

E. limosum, *L.*, var. **fluviatile,** *Rabenh.* A. Lake.

2. MUSCINEAE (Mosses).

By E. S. Salmon, F.L.S.

One hundred and nine species of mosses and seven varieties have been collected in the Royal Botanic Gardens, Kew. With a few exceptions, these were all observed during the period 1897–98. The strip of ground between the gardens and the Thames has been added so as to make the area the same as that worked by Mr. George Nicholson for his "Wild Flora of Kew Gardens."

To anyone unacquainted with the wild parts of Kew Gardens it may seem incautious to consider as indigenous any of the mosses now found growing within these limits. But it is only with regard to those of a very few places, such as the rockery, for which some of the stones were originally obtained from Cheddar and Bath and may possibly have brought mosses attached to them, that a probability of introduction exists. In many places in the gardens, *e.g.*, the boundary ditch and bank running the length of the Old Deer Park, the Queen's Cottage Grounds, parts of the palace grounds, &c., the nature of the surface makes it quite safe to consider the species growing there as indigenous. The inclusion of the river-bank in the area has led to the addition of several interesting aquatic mosses, and, without doubt, all these are quite wild.

A few common species are absent from the list, while, on the other hand, several rare species occur in it.

Amblystegium Kochii, known only from one or two counties in England, occurs at Kew in a few places by the Thames, together with *A. varium*, *Fissidens crassipes*, *Physcomitrium pyriforme*, *Leskea polycarpa*, *Cinclidotus fontinaloides*, &c.

Of other interesting species, *Mnium cuspidatum*, *M. stellare*, *Bryum Donii*, *Tortula intermedia*, *Trichostomum tortuosum*, *Encalypta streptocarpa*, *Barbula lurida*, and *Neckera crispa* have been noticed only in or about the rockery; and, for reasons mentioned above, their origin must remain doubtful.

On the other hand, the following species (amongst others) are certainly wild:—*Polytrichum formosum*, *Plagiothecium borrerianum*, *Pleuridium axillare*, *P. subulatum*, *P. alternifolium*, *Funaria fascicularis*, *Pottia lanceolata*, *Tortula marginata*, *Fissidens pusillus*, *F. exilis*, *F. incurvus*, *F. viridulus*, *Leptobryum pyriforme*, *Acaulon muticum* and var. *mediterraneum*, *Bartramia pomiformis*, *Ephemerum serratum*, *Aulacomnium androgynum*, *Dicranum Bonjeani*, *Thamnium alopecurum*, *Eurhynchium piliferum*, and *E. megapolitanum*.

I have to thank Mr. George Massee for a list, accompanied by specimens, of 20 Kew mosses, collected by him in previous years. Five of them, which I have not been able to refind, are included in the list on his authority. In most cases the habitats of these species have become changed through improvements, and the species are very probably now lost.

To Mr. George Nicholson I am greatly indebted, not only for furnishing me with a list of about 40 mosses already recorded for Kew Gardens, but also for showing me the original stations for many of these, and for helping me to search for new species.

The nomenclature followed is that of Dixon's "Students' Handbook of British Mosses."

I have placed specimens of the more interesting species in the Kew Herbarium.

Catharinea undulata, *Web. et Mohr.* Common, and fruiting freely in all the drier places, as in the Rockery, where it forms luxuriant patches.

Polytrichum aloides, *Hedw.* In several places along the boundary ditch by the Old Deer Park, between the Lion Gate and Queen's Cottage; fruit not seen.

P. piliferum, *Schreb.* Not uncommon in dry places; abundant along the boundary ditch with the last species: sandy banks near the lake, &c.; occasionally fruiting.

P. juniperinum, *Willd.* Abundant in dry places throughout the Gardens; frequently fruiting.

P. formosum, *Hedw.* Fairly common in sandy places, in the open, and also under trees; fruiting in the Arboretum.

A curious *Polytrichum*, intermediate in some characters between *P. formosum* and *P. gracile*, Dicks, occurs in a few places along the boundary ditch by the Old Deer Park. In this form the leaf-base, instead of being composed of cells about 6–10 times as long as broad, as is usual in *P. formosum* (see Dixon, *Student's Handbook*, p. 46), shows an areolation similar to that of *P. gracile*, the cells being comparatively wide, and only 3–4 times as long as broad. Occasionally, also, the plant shows a further approach towards *gracile*, as some of the leaves have rather a wide limb in the upper part of the leaf, and frequently the lamellæ are only about 40 in number.

Both Mr. W. E. Nicholson and Mr. Dixon at first referred the plant to *P. gracile*, Dicks, relying especially on the short wide basal areolation. I have since heard from Mr. Dixon, however, that Mr. Bagnall, to whom specimens of the Kew plant were submitted, thinks that it should be referred to *P. formosum*, and that Mr. Dixon himself is now inclined to agree with the view that it is nearer that species than *P. gracile*, although still thinking that there is an approach to the form of areolation of the latter. Only barren plants of this form, which is certainly native, have so far been found.

Pleuridium axillare, *Lindb.* (c. fr.). In the Bamboo Garden and near the Pumping Station. Occurs commonly in pots in the Glass-houses, where the leaf-cells become very lax.

P. subulatum, *Rabenh.* (c. fr.). Not uncommon on sandy ground; about the lake and on the islands; Bamboo Garden; Tulip Tree Avenue; P.

P. alternifolium, *Rabenh.* (c. fr.). A. Bare places near the lake; Rose Garden, on earth adhering to stumps.

Ceratodon purpureus, *Brid.* Abundant and common in fruit throughout the area.

Dicranella heteromalla, *Schimp.* Abundant and fruiting in all the drier places.

Dicranella cerviculata, *Schimp.* (c. fr.). Kew Gardens (unlocalised, Massee, 1897).

D. varia, *Schimp.* On mud thrown up from a ditch, near Pumping Station, in fruit (Massee, 1897).

Dicranum Bonjeani, *De Not.* Q. Abundant in one place, barren; A. Pinetum; B. Small form, growing on a bank, with a very different habit from the type, is referred to this species by Mr. Dixon with the following note:—"I think your *Dicranum* must be *Bonjeani* from the general 'tone' and areolation and thin nerve without ridges at the back, as well as the undulation, which is indeed very faint (the leaves being so short), but is distinguishable on most leaves, I think, or many, at least. It is a very short-leaved form.

D. scoparium, *Hedw.* Common in dry places under trees, amongst grass, &c.; barren.

Fissidens exilis, *Hedw.* (c. fr.). A. On the third island (from culvert end) in the lake; Q. In an open space.

F. viridulus, *Wahlenb.* (c. fr.). Q. On a loose stone; boundary ditch near the river; A. On stones embedded in the bank near the Lion Gate end of the boundary ditch.

Var. **Lylei,** *Wils.* Some of the plants from the first locality given above have leaves which, by being unbordered, except on the vaginant-laminæ, must be referred to this variety.

F. pusillus, *Wils.* (c. fr.). P. On brick steps; R. On stones. Abundant on the sandstone rocks in the Temperate House.

F. incurvus, *Starke* (c. fr.). Q. Side of the boundary ditch.

F. bryoides, *Hedw.* Very common; fruiting both in wet places, such as the banks of the lake, and on dry sandy banks.

F. crassipes, *Wils.* (c. fr.). By the riverside, on wood; often submerged at high tide; B. On mortar, wall of tank in Herbaceous Ground (Massee, 1897). One of the most interesting of the Kew mosses, and occurring in fair quantity in the first-mentioned locality. The thick seta easily distinguishes this species in the field.

F. taxifolius, *Hedw.* Not uncommon in damp places; about the lake; river-side; Palace Grounds; not found in fruit.

Grimmia pulvinata, *Sm.* (c. fr.). R. On stones; P. On the wall by the river.

Acaulon muticum, *C. Müll.* (c. fr.). On third island (from culvert end) in the lake, on stiff clay; and (*A. mediterraneum*, Braithw.). A. Sandy ground near the west end of the lake; P. Sandy bank (Nicholson).

I do not think that the plant described by Braithwaite under the name of "*Acaulon mediterraneum*, Limpr.," in the British

Moss Flora, i, p. 301, deserves to rank higher than a variety of *A. muticum*.

On a sandy bank near Bexhill, Sussex, I have collected an *Acaulon*, in which the long inner bract is completely wrapped round the fruit, and the plants are tall, and sometimes slightly curved,—in fact, agreeing well with *A. mediterraneum* as described in the British Moss Flora, (loc. cit.). Dr. Braithwaite agreed with me in referring the plant to that species. Of the Kew specimens of *Acaulon*, those from the damp ground of the island in the lake have connivent subequal bracts, and capsules scarcely, or not at all apiculate, those from the sandy ground have unequal bracts, with the inner longer one more or less convolute, and the capsule minutely apiculate. I have, however, seen so many plants, from other localities, presenting exactly intermediate characters, that I am strongly of opinion that "*A. mediterraneum*" is not specifically distinct from *A. muticum*, but is to be regarded as a variety of the latter, produced (in my experience) in dry sandy localities. It may also be pointed out that Dr. Braithwaite's description of "*A mediterraneum*, Limpr.," does not agree at all well with Limpricht's original diagnosis. (*Rabenh. Krypt. Fl. Deutschland*, iv. (1885) p. 180). Dr. Braithwaite emphasizes the convolute bract, and describes the plant as taller than *A. muticum*; Limpricht says that his species is smaller than *A. muticum*, with leaves smaller, not (or scarcely) connivent, and capsule visible from above, and does not mention the convolute inner bract, nor the apiculate capsule. *A. mediterraneum*, as described by Limpricht, seems altogether nearer to *A. muticum*. var *minus*, than to the plant described and figured by Dr. Braithwaite as Limpricht's species.

Phascum cuspidatum, *Schreb.* (c. fr.). Frequent in bare places among the grass; on paths, &c.

Var. **schreberianum**, *Brid.* A. Bare places among the gorse, west end of the lake.

Pottia truncatula, *Lindb.* (c. fr.). Not common. P. Nurseries, &c.

P. intermedia, *Fürnr.* (c. fr.). A. North side of lake, 1901.

P. lanceolata, *C. Müll.* (c. fr.). A. North side of lake, 1901.

Tortula ambigua, *Angstr.* (c. fr.). R. (Massee, 1897).

T. marginata, *Spruce* (c. fr.). R. Abundant on stones. P. Brick steps. Certainly indigenous.

T. muralis, *Hedw.* (c. fr.). Abundant everywhere, on walls and stones.

Var. **aestiva**, *Brid.* Fernery, one or two tufts of a well-marked state of this variety.

T. intermedia, *Berk.* R. Several tufts, here and there, on the stones, barren; also in fruit (Massee, 1897).

Barbula rubella, *Mitt.* (c. fr.). R. Common.

Barbula fallax, *Hedw.* Not uncommon; riverside and gardens occasionally fruiting.

B. hornschuchiana, *Schultz.* A. Among the grass, near the lake, barren.

B. revoluta, *Brid.* R. In several places, barren; also in fruit (Massee, 1897).

B. unguiculata, *Hedw.* Common throughout the gardens, rarely fruiting.

B. lurida, *Lindb.* R. Sparingly, and barren.

B. vinealis, *Brid.* R. In several places, barren.

Weisia squarrosa, *C. Müll.* (c. fr.). On mud thrown up from a ditch, near pumping station, in fruit (Massee, 1897).

W. viridula, *Hedw.* (c. fr.). Q. Common along the boundary ditch.

Trichostomum tortuosum, *Dixon.* R. Very sparingly and barren, on stones.

Cinclidotus fontinaloides, *P. Beauv.* Not uncommon by the river, fruiting occasionally.

Encalypta streptocarpa, *Hedw.* R. On stones, barren.

Orthotrichum anomalum, *Hedw.*, var. **saxatile,** *Milde* (c. fr.). R. A few tufts; on a wall, by the river-side.

O. affine, *Schrad.* (c. fr.). By the river-side, very sparingly, on a stone wall.

O. diaphanum, *Schrad.* (c. fr.). Wall, by the river, sparingly.

Ephemerum serratum, *Hampe* (c. fr.). On a bank near the south end of the lake.

Physcomitrium pyriforme, *Brid.* Patches of fruiting plants here and there by the river-side.

Funaria fascicularis, *Schimp.* P. A few fruiting plants, on a sandy bank, with *Bartramia pomiformis*, certainly native. A. Mr. G Nicholson and Mr. E. M. Holmes have gathered it near the flagstaff, but it has now disappeared from this locality.

F. hygrometrica, *Sibth.* (c. fr.). Abundant everywhere—in the driest places, as on cinders, as well as by the river-side, where it is often submerged.

Aulacomnium androgynum, *Schwaeg.* Q. Gemmiferous state; on elder tree. A. On a tree near the flagstaff.

Bartramia pomiformis, *Hedw.* Q. Quite wild; boundary ditch. P. In both places with a few capsules.

Leptobryum pyriforme, *Wils.* R. Not uncommon; fruiting on stones. P. On ground, among grass. Occurs commonly in pots in the glass-houses, forcing-pits, &c.

Webera nutans, *Hedw.* (c. fr.). Common. Q. On stumps A. Bamboo garden, &c.

W. carnea, *Schimp.* Barren. Bamboo garden; river-side.

Bryum inclinatum, *Bland.* R. In fruit. A. Rose garden.

B. pallens, *Sw.* R. On a wet bank; a dark-green form with numerous protonematoid branches.

Mr. Dixon reported on it: "I believe your *Bryum* is a form of *B. pallens.* It has the peculiar areolation of that which is somewhat hard to define, decurrent leaves, &c. The var. *speciosum* is something like it, but not quite the same. The tips of the branches show a little of the characteristic vinous red of *pallens.* The gemmiform threads I should take to be an *abnormal* outgrowth such as one finds in mosses growing in unusually damp situations."

B. pseudo-triquetrum, *Schwaeg.* By the river-side. A. Near rose garden. Barren.

B. caespiticium, *Linn.* (c. fr.). Not uncommon. R., &c.

B. intermedium, *Brid.* (c. fr.). Q. In an open spot.

B. capillare, *Linn.* R. Abundant, fruiting. Q. Boundary ditch, &c.

B. donianum, *Grev.* R. One tuft, with a few capsules.

B. erythrocarpum, *Schwaeg.* Not uncommon, often among grass. Bamboo garden, P., &c.

B. atropurpureum, *Web. et Mohr.* (c. fr.). A. On stumps near lake.

B. argenteum, *Linn.* On paths, roofs, stones, &c.; occasionally fruiting.

Var. **lanatum,** *Bruch et Schimp.* Commoner than the type in the area; occurring in dry places, especially on walls exposed to the sun. All authors, without exception, as far as I can find, describe the nerve of the leaf of *B. argenteum* as ceasing below the apex, and it does not seem to have been noticed that in the var. *lanatum* the nerve is distinctly excurrent. Most authors describe only the shape of the leaf as characteristic of the var. *lanatum*, without referring to the nerve: Husnot (*Musc. Gall.* i., 243), however, describes and figures the nerve as very short. In the Kew plant, as mentioned above, as well as in all other examples of the var. *lanatum* that I have seen, the nerve is distinctly excurrent, and I believe that this structure is characteristic of the variety.

Mnium affine, *Bland.* Amongst grass. P.

M. cuspidatum, *Hedw.* (non *Neck.*). R. Occasionally producing a few capsules; originally found by Mr. G. Nicholson.

M. rostratum, *Schrad.* Not uncommon in dry places among the grass; fruiting in the Queen's Cottage Grounds (Massee, 1897).

M. undulatum, *Linn.* Q., P. Sparingly.

M. hornum, *Linn.* (c. fr.). Common; very fine in Q., P., &c.

M. stellare, *Reichb.* In one place in the Rockery.

Fontinalis antipyretica, *Linn.* In the moat by the river.

Neckera crispa, *Hedw.* R. Very sparingly, and starved.

Porotrichum alopecurum, *Mitt.* Q.; also occurs in the Winter Garden.

Leskea polycarpa, *Ehrh.* By the river-side; frequent on wood; occasionally on the stone wall; often fruiting. Probably the same station as that indicated in De Crespigny's "New London Flora," p. 90 (1877).

Thuidium tamariscinum, *Bruch et Schimp.* P.; Q.; A., fine and plentiful, on banks near the bamboo garden.

T. recognitum, *Lindb.* Among grass, P. (Massee, 1898.)

Pleuropus sericeus, *Dixon.* Frequent on stones and walls. R., river-side, &c.; not noticed in fruit.

Brachythecium albicans, *Bruch et Schimp.* Bank by the North Gallery; among grass about the lake; river-side, between the west boundary and Isleworth Gate.

B. rutabulum, *Bruch et Schimp.* Common and fruiting freely.

B. velutinum, *Bruch et Schimp.* (c. fr.). Rather common; islands in the lake; Q., boundary ditch; P., &c. Plants from the Palace grounds have long setæ, and drawn out stems, and agree with the var. *prælongum* of the Bryologia Europæa, which cannot, however, be considered more than a form.

B. populeum, *Bruch et Schimp.* Fernery (fruiting); R.; wall by river.

B. purum, *Dixon.* Common among the grass, &c.

Eurhynchium piliferum, *Bruch et Schimp.* P., in one place; native.

E. crassinervium, *B. & S.* The Rev. H. P. Reader informs me that he has in his herbarium an example of this species labelled "Kew Gardens, 1878 (Geo. Nicholson)."

Eurhynchium prælongum, *Bruch et Schimp.* Abundant everywhere; occasionally fruiting. Also occurs fruiting in some of the Houses, e.g., Winter Garden.

E. Swartzii, *Hobkirk.* On the ground, river-side; P.; Q., boundary ditch; also a very pretty form; more closely branched than usual, on stones near the Cumberland Gate; Winter Garden.

E. pumilum, *Schimp.* P.; also occurs plentifully on stones in the Winter Garden.

E. tenellum, *Milde.* R. Barren. Fruiting on Tree-Fern stems in the Winter Garden. These plants have quite smooth setæ, so that they cannot be referred to the var. *scabrellum*, Dixon, which is the usual form found on tree trunks, stumps, twigs, &c. Mr. W. E. Nicholson informs me, however, that he has met with the type occasionally on trees in Sussex.

E. rusciforme, *Milde.* Abundant, and fruiting freely, by the river.

E. murale, *Milde.* Not uncommon on stones. R., &c., fruiting freely.

E. confertum, *Milde.* Abundant in fruit. P.; wall by the river; R., &c.

E. megapolitanum, *Milde.* P. Among the grass, on sand, fruiting. Certainly native. Mr. W. E. Nicholson tells me that the Kew plant agrees well with examples collected by him on sandy banks in West Sussex.

Plagiothecium borrerianum, *Spruce.* Frequent, often forming large patches on sandy banks, as about the bamboo garden.

P. denticulatum, *Bruch et Schimp.* Frequent. R., P., &c. Occasionally fruiting.

P. sylvaticum, *Bruch et Schimp* (c. fr.). Q., P. Sparingly.

Amblystegium serpens, *Bruch et Schimp.* (c. fr.). Abundant everywhere.

A. varium, *Lindb.* In a few places by the river.

A. filicinum, *De Not.* R. Common; on wall by river-side.

A. Kochii, *Bruch et Schimp.* In one or two spots by the river. This is one of the rarest species of the genus. It is unquestionably native in its Kew stations.

Hypnum riparium, *Linn.* (c. fr.). About the lake, on the islands; all along the river-side.

H. elodes, *Spruce.* On an old stump, near the Cumberland Gate, in fruit (Massee, 1897). A very interesting record. Unfortunately

the species cannot be refound, and it is probable that it has disappeared from the original locality through the formation of a rockery.

Hypnum stellatum, *Schreb.* R. Very sparingly.

H. cupressiforme, *Linn.* Abundant.

Var. **resupinatum,** *Schimp.* R. Boundary ditch. P., &c., not uncommon.

Var. **filiforme,** *Brid.* On trees. Q., A.

H. molluscum, *Hedw.* R. In a few places.

H. palustre, *Linn.* Here and there by the river-side. A curious form, growing on wood more or less submerged at high tide, is thus reported on by Mr. Dixon: "I take your moss to be a curious form of *H. palustre;* a single-nerved form, but nerve sometimes very feeble. The leaf-apex is characteristic, and on some of the stems the leaves have the secund position usual in the species."

H. cuspidatum, *Linn.* P.; R.; among the grass in many places.

H. Schreberi, *Willd.* Abundant in the pinetum, near the Water-Lily Pond.

Hylocomium squarrosum, *Bruch et Schimp.* Very common among the grass under trees.

The following species have occurred in the glass-houses only:—

Physcomitrium eurystomum, *Sendt.* (c. fr.). On earth, in a pot, No. 2 House (Nicholson).

Aulacomnium palustre, *Schwaeg.* Common in several of the Houses, especially the Filmy-Fern House, in the gemmiferous state. First noticed here by Professor Bower, see Journ. Linn. Soc. (Bot.), xx. (1884), p. 465, where an account of the structure and germination of the gemmæ is given. The pseudopodia are sometimes quite leafless, just as in *A. androgynum.*

Fissidens Nicholsonii, *Salmon, Annals of Botany,* xiii., 123, pl. vii., ff. 81–91 (1899).

Mr. Nicholson discovered this *Fissidens* growing in one of the Houses, on a Tree-Fern stem, brought from Jamaica. It proved on examination to be a new species allied to *F. Ravenelii,* Sulliv.

Hypopterygium viridulum, *Mitt.* Trunks of Tree-Ferns, Winter Garden.

Rhizogonium pennatum, *Hook f. et Wils.* Common in the Filmy-Fern House.

Cyathophorum pennatum, *Brid.* At the base of Tree-Fern stems, Winter Garden.

3. HEPATICAE. (Liverworts.)

MARCHANTIALES.

MARCHANTIACEAE.

Reboulia, *Nees.*

R. hemisphaerica, *Raddi.* On stones. Rockery.

Lunularia, *Mich.*

L. vulgaris, *Mich.* On damp soil. Common.

Dumortiera, *Reinw.*

D. hirsuta, *Reinw.* On soil. Fern houses.

Marchantia, *Linn.*

M. polymorpha, *Linn.* On damp soil. Common.

JUNGERMANNIALES.

ANAKROGYNÆ.

Metzgeria, *Raddi.*

M. furcata, *Nees.* On stones. Merlin's cave.

Monoclea, *Hook.*

M. Fosteri, *Hook.* On damp soil. Filmy fern house.

Pellia, *Raddi.*

P. epiphylla, *Nees.* On damp soil. Rockery.

AKROGYNÆ.

Lophozia, *Dumort.*

L. quinquedentata, *Dumort.* Amongst filmy ferns in fern pit.

Plagiochila, *Nees & Mont.*

P. distinctifolia, *Lindenb.* In filmy fern house.

Lophocolea, *Nees.*

L. bidentata, *Dumort.* On moist soil. Common.

Saccogyna, *Dumort.*

S. viticulosa, *Dumort.* Amongst filmy ferns in fern pit.

Cephalozia, *Dumort.*

C. divaricata, *Spruce.* On stones Fern house.

Bazzania, *S. F. Gray.*

B. anisostoma, *Steph.* On fern stem. Fern house.

Lejeunia, *Gott. & Lindenb.*

L. serpyllifolia, *Libert.* On stones. Rockery.

Frullania, *Raddi.*

F. Tamarisci, *Nees.* Amongst filmy ferns in fern pit.

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4. LICHENES. (Lichens.)

By O. V. Darbishire, M.A.

The lichens found in the Gardens are very few in number, not only of individuals but also species. They are, furthermore, as a rule very poorly developed, a condition of things very generally prevailing near and in towns.

Of the species mentioned in the following list, *Lepra viridis* alone appears to be in a flourishing condition in the Gardens. To it is due the green colour commonly seen on the bark of older trees and on wood palings. It is an incomplete lichen, consisting of masses of green algae enveloped by a thin coat of fungal hyphae, but never producing any fruit. *Lecanora crenulata* seems to be fairly well distributed on limestone rocks and building stones, otherwise the specimens are mostly dwarfed and scanty.

Most of the species where no locality is given were found in the rock garden, but nearly every bit of limestone bears small apothecia of *Lecanora crenulata.*

Cladonia chlorophaea, *Flk,*

C. cornucopioidea, *Ngl.*

C. fimbriata, (*L.*) *Fr.*

C. furcata, (*Huds.*) *Fr.* Wood palings on the river-side path towards Richmond.

C. pyxidata, (*L.*) *Fr.*

Lecanora crenulata, *Dicks.*

L. Hageni, (*Ach.*) *Kbr.*

L. varia, (*Ehrh.*) *Ach.* Oak palings near stable yard.

Parmelia saxatilis, (*L.*) *Fr.*

Placodium Murorum, *Ngl.*

Pannaria pezizoides, *Weber.* On bare ground; formerly common on slope of bank facing Palace Grounds.

Peltigera canina, (*L.*) *Schær.*

Collema limosum, *Ach.*

Lepra viridis, *Schær.*

Leproloma lanuginosum, (*Ach.*) *Ngl.*

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5. FUNGI.

By G. Massee, F.L.S.

The following enumeration of 378 genera and 1,742 species illustrates the richness of the mycologic flora of the Royal Gardens, which far surpasses in point of numbers, as also in the variety of rare and interesting species, any other record for an equal area.

This is only perhaps what would be expected, when the large annual influx of plants to Kew from all quarters of the globe is taken into consideration. By this means microscopic fungi, parasitic on plants or saprophytic, are introduced in a living condition on the various hosts, whereas the higher forms belonging to the Agaricinæ and the Gastromycetes are usually introduced along with soil, or frequently on the trunks of tree-ferns, either in the form of spores, or in an undeveloped condition.

It is worthy of note that the *Polyporeae* and *Thelephoreae*, so abundant in tropical regions, are absent from the list as introduced species.

As illustrative of the exotic element may be mentioned *Hiatula Wynniae*, Berk. and Broome, first described (*Ann. Mag. Nat. Hist.*, 1879, p. 206), from specimens found in a stove in the Gardens; this species has recently been received from the neighbourhood of Brisbane, where it is not uncommon, and said to be luminous, emitting a pale green light. It is figured by Cooke (*Illustr. Brit. Fung.*, pl. 688). *Flammula purpurata*, Cke. & Mass., a very beautiful fungus, was established (*Grev.*, xviii., 73) from specimens growing on the trunk of a tree-fern in one of the fern-houses, and has since been received from New Zealand, its undoubted home. *Aseröe rubra*, La Bill., the most beautiful of the many quaint forms belonging to the Gasteromycetes, a native of Queensland, also occurred in a stove, some time previous to the year 1867; the specimens are at present in the herbarium. The genus *Chitonia*, including only four known species, is represented by *C. rubriceps*, Cke. & Mass. (*Grev.*, xv., 57), found on soil in the aroid house, but although a typical member of an exotic genus, no clue as to its native habitat has yet been obtained.

Coming to microscopic forms, we find that the list contains a still greater per-centage of introduced species, *i.e.*, species new to

the British list, and growing on exotic plants. The genus *Phoma* heads the list with 109 species, of which above three-fourths have been met with only at Kew, so far as the British Isles are concerned, and of these above 30 were first established from Kew material by Dr. Cooke, who paid special attention to this genus.

Not a single example, however, of a parasitic fungus, that has proved to be destructive to plants, has been introduced to Europe through Kew.

The indigenous species of fungi belonging to the Agaricineae—probably due to a great extent to the absence of cattle in the grounds—are fewer than would be expected, with the following notable exceptions. In the genus *Russula* 53 species have been observed during the last 10 years, out of a total of 61 British species. The large size and brilliant colouring of most species belonging to this genus render them very conspicuous objects in the arboretum during late summer and early autumn. Another genus containing species of sufficient size and brilliancy of colour to attract popular attention is *Boletus*, which numbers 28 species.

A fairly good collection of specimens of fungi, along with models and drawings, are exhibited in No. 2 Museum.

A word of thanks is due to the members of the Garden staff, interested in mycology, for the discovery of numerous species, which, but for their zeal, would not have appeared in the present list.

The host-plant, or matrix, on which each fungus occurred, has been given, and also the locality for the larger species that are likely to occur again. Finally, notes have been added, indicating the edible and poisonous species of the Agaricineæ, also the parasitic species that are known to be destructive to plants.

Species known to be introduced are distinguished by an asterisk.

The species of Myxogastres occurring at Kew are given in an Appendix at the end.

BASIDIOMYCETES.

HYMENOMYCETES.

AGARICINEAE.

Amanita, *Fries.*

A. virosa, *Fries.* Among grass. Poisonous. A.

A. Mappa, *Batsch.* Under beeches. Poisonous. A.

A. phalloides, *Fries.* A dangerous species. It has been proved that a large percentage of the accidents caused by fungus poisoning, both in this country and on the Continent, have been caused by this species. A figure is exhibited in No. 2 Museum.

Amanita muscaria, *L.* A large, showy fungus, the cap when expanded often as large as a dinner-plate, brilliant crimson with white spots. Very poisonous. Q.

A. rubescens, *Pers.* Edible, flavour mild ; the flesh of cap and stem turns red when broken. Care must be taken not to confound this species with *Amanita pantherina*, which is poisonous. A., Q.

A. pantherina, *DC.* Under trees. Poisonous. The flesh remains perfectly white when broken. A.

A. spissa, *Fries.* Under beeches. A.

A. nitida, *Fries.* Under beeches. Poisonous. A.

Amanitopsis, *Karsten.*

A. vaginata, *Karsten.* Edible, flavour very delicate. Colour of cap variable, grey, buff, orange, or white. A., Q.

A. strangulata, *Fries.* Among grass under trees. Q.

Lepiota, *Fries.*

L. procera, *Scop.* Edible. Popularly known as the parasol mushroom, on account of its shape. Sometimes very large, a specimen from the Aboretum had a stem 16 inches long and pileus 11 inches across. A., B., Q.

L. rachodes, *Vitt.* Edible ; similar in flavour and appearance to *L. procera.* Q.

Var. **puellaris,** *Fries.* A.

L. excoriata, *Schaeff.* Edible. B.

L. leucothites, *Vitt.* Edible. B.

L. gracilenta, *Kromb.* Under beeches. A.

L. mastoidea, *Fries.* Among grass. A.

L. Friesii, *Lasch.* Under trees. Q.

L. acutesquamosa, *Wein.* Under yews. Q.

L. Badhami, *Berk. & Broome.* Under *Sequoia sempervirens.* A.

L. emplastra, *Cke. & Mass.* Under *Cedrus Libani.* This species was founded on specimens collected in the gardens and is described (*Grev.*, xviii. 51). A figure is given in *Illustr. Brit. Fungi*, pl. 1164.

L. clypeolaria, *Bull.* A.

L. cristata, *Fries.* A.

L. cepaestipes, *Sow.* On soil in conservatory.

Var. **cretaceus,** *Bull.* In a stove.

Lepiota licmophora, *Berk. & Broome.* On soil in Palm house. A very elegant fungus, a native of Ceylon, established by Berkeley & Broome (*Journ. Linn. Soc., Bot.* xi. 500) ; figured in Cooke's *Illustr. Brit. Fungi*, pl. 1179.

L. carcharia, *Pers.* Under *Pinus sylvestris.* A.

L. granulosa, *Batsch.* Under *Pinus sylvestris.* A.

L. martialis, *Cke. & Mass.* On palm stem in Palm house.

L. ianthina, *Cke.* On soil in a stove.

L. felina, *Pers.* On the ground. A.

L. naucina, *Fries.* On naked soil. A.

L. illinita, *Fries.* On the ground under ferns. Q.

L. Georginae, *W. G. Sm.* Among dead leaves. This very peculiar species is pure white, but becomes blood red when touched. Q.

Armillaria, *Fries.*

A. mellea, *Vahl.* On the ground, round roots of trees. A destructive parasite, destroying trees, especially attacking those that have been injured near the base of the trunk. When the disease is once established, the cord-like mycelium or spawn spreads in the ground until it comes in contact with the roots of another tree, which is attacked in turn. Edible, but lacking flavour. A., B.. Q.

A. Citri, *Inzeng.* On stump. B.

A. denigrata, *Fries.* Under cedars. A.

Hiatula, *Fries.*

H. Wynniae, *Berk. & Broome.* In a stove. An introduced species of Australian origin. In Queensland it is said to be luminous, emitting a pale greenish light at night.

Tricholoma, *Fries.*

T portentosum, *Fries.* Under trees. A.

T. gambosum, *Fries.* Among grass. One of the few large agarics appearing in spring. A.

T. flavo-brunneum, *Fries.* Under trees. Q.

T. albo-brunneum, *Pers.* Under trees. A.

T. rutilans, *Schaeff.* On stumps. B.

T. imbricatum, *Fries.* Under trees. A.

T. terreum, *Fries.* Under trees. Q.

T. saponaceum, *Fries.* On the ground. Smell strong, like soap. A. and B.

Tricholoma sulfureum, *Bull.* On the ground. Smell strong, very unpleasant. A., P.

T. ionides, *Bull.* Among grass. A.

T. carneum, *Bull.* Among grass. A.

T. album, *Schaeff.* Among grass under trees. A., Q.

T. duracinum, *Cke.* Under beeches. First observed at Kew. Described, *Grev.*, xii., 41 ; figured, *Illustr. Brit. Fung.* pl. 640). A.

T. personatum, *Fries.* Among grass. Edible. One of the few species which, in addition to the common mushroom, may sometimes be seen offered for sale under the name of "Blewits" or "Blue-caps." A., B.

T. tigrinum, *Schaeff.* Under conifers. A.

T. patulum, *Fr.* Among grass. Q.

T. nudum, *Fries.* Among grass. Edible ; preferred by some people to *T. personatum*, which it much resembles. A.

Var. **major**, *Cke.* A.

T. melaleucum, *Fries.* On the naked ground. A., B.

Var. **porphyroleucum**, *Fries.* B.

T. brevipes, *Bull.* On the ground. A.

T. humile, *Fries.* On heaps of dead leaves. A.

T. sordidum, *Fries.* On heaps of dead leaves. A.

T. Pes-caprae, *Schaeff.* On the ground under beeches. A.

T. tigrinum, *Schaeff.* Under pines. A.

T. circumtectum, *Cke. & Mass.* Under beeches. First found in the gardens in 1886, and afterwards in abundance in Yorkshire. (*Cke. Hdbk.*, ed. ii. 382 ; *Illustr. Brit. Fung.* pl. 1182.) A.

T. saevum, *Fries.* A very fine fungus, somewhat resembling *T. personatum*, from which it differs in absence of violet tinge in gills, and short, stout, squamulose stem. Among grass, under trees. A.

T. tenuiceps, *Cke. & Mass.* Under trees. (*Cke. Hdbk.* ed. ii. 398; *Illustr. Brit. Fung.* pl. 1166.) A.

T. Russula, *Schaeff.* Among grass. A.

T. subpulverulentum, *Fries.* Among grass. A.

T. cuneifolium, *Fries.* Under trees. P.

T. grammopodium, *Fries.* Among short grass. A., Q.

Clitocybe, *Fries.*

C. nebularis, *Batsch.* Under trees among leaves. Edible; a large fleshy fungus having an excellent flavour, fairly abundant, and not easily mistaken for any other species when once understood. Q.

C. clavipes, *Fries.* Under trees. A.

C. odorus, *Fries.* On the ground. A., Q.

C. cerussatus, *Fries.* Under trees. A.

C. phyllophilus, *Fries.* Among dead leaves. A., Q.

C. pithyophilus, *Fries.* Among dead leaves. A.

C. tornatus, *Fries.* Under trees. Q.

C. candicans, *Fries.* Among leaves. A., P.

C. fumosus, *Pers.* Among grass by paths. A.

C. infundibuliformis, *Schaeff.* Among grass. Q.

C. inversus, *Scop.* Under cedars. P.

C. flaccidus, *Fries.* Under trees. P.

C. Tuba, *Fries.* Among grass. Q.

C. maximus, *Fries.* On the ground among grass. A very fine and noble fungus, more or less funnel-shaped. The largest specimen found measured 10 inches across the pileus. Q.

C. dealbatus, *Fries.* Among dead leaves. Q.

C. gilvus, *Fries.* Under cedars. A.

C. lobatus, *Sow.* Under cedars. Pileus rich orange-brown, margin deeply lobed. A.

C. cyathiformis, *Fries.* Under trees. A., B.

C. pruinosus, *Fries.* Among grass. A.

C. brumalis, *Fries.* Under trees. Q.

C. metachrous, *Fries.* Under trees. A., Q.

C. fragrans, *Sow.* Among grass. A., P.

C. suaveolens, *Fries.* Among grass. Smell strong, spicy. A.

C. ditopus, *Fries.* Among dead leaves. A., Q.

Laccaria, *Berk. & Broome.*

L. laccata, *Berk. & Broome.* Among grass under trees. A.

Laccaria bella, *Berk. & Br.* Among dead leaves Q.

Collybia, *Fries.*

C. radicata, *Fries.* Among grass. A., B.

C. platyphylla, *Fries.* On the ground under trees.

C. lancipes, *Fries.* On the ground. A rare fungus, probably often passed over for *C. fusipes*, from which it differs in the radiately rugulose pileus and scattered habit of growth. Q.

C. fusipes, *Bull.* Among grass in open places. Edible. A.

C. maculata, *Alb. & Schw.* Among grass. A.

C. prolixa, *Fries.* On the ground near stumps. Q.

C. distorta, *Fries.* On heaps of dead leaves. A.

C. butyracea, *Bull.* On the ground under trees. A., Q.

C. stipitaria, *Fries.* On twigs lying on the ground. B.

C. confluens, *Pers.* On the ground. Densely tufted; tough, and resembling a *Marasmius* in habit. A.

C conigena, *Pers.* On fallen cones of *Pinus sylvestris.* A.

C. cirrhata, *Schum.* On the ground among grass and moss. A., Q.

C. tuberosa, *Bull.* On decaying *Russula nigricans.* Springing from a small sclerotium. A., Q.

C. xylophila, *Fries.* On a decayed, fallen trunk. Q.

C. vertiruga, *Cooke.* On rotten twigs. A very pretty species, distinguished by the wrinkled pileus and velvety stem. Q.

C. hariolorum, *Bull.* Among dead beech leaves lying on the ground. A.

C. xanthopoda, *Fries.* On the ground. A.

C. nitellina, *Fries.* On the ground. A.

C. esculenta, *Jacq.* On the ground under trees. A.

C. tenacella, *Pers.* Under pines. A.

C. dryophila, *Bull.* On the ground under trees. A., Q.

C. aquosa, *Bull.* Among grass under trees. A.

C. ocellata, *Fries.* Among grass. A.

C. muscigena, *Schum.* On the ground among moss and grass. Q.

C. rancida, *Fries.* On stumps. Smell strong, rancid. A.

C. ambusta, *Fries.* On burnt ground. A.

C. protracta, *Fries.* Among leaves lying on the ground. A.

Collybia nummularia, *Bull.* Among dead leaves. A.

C. atrata, *Fries.* On burnt ground. Q.

Mycena, *Fries.*

M. pelianthina, *Fries.* Among leaves under trees. A.

M. pura, *Pers.* On the ground under trees. A., Q.

M. pseudopura, *Cooke.* On the ground under trees. Resembling *M. pura* in general appearance and habit, but somewhat smaller and having much larger spores. Q.

M. rubromarginata, *Fries.* On the ground. Q.

M. olivaceo-marginata, *Massee.* Among short grass, growing in troops. Distinguished by the honey-coloured pileus and stem and the dark olive edge of the gills. (*Cooke's Hdbk.* Ed. II. p. 369; *Cooke's Illustr.* pl. 959A.)

M. lineata, *Bull.* Among grass. A.

M. luteo-alba, *Bull.* Among short grass. A.

M. rugosa, *Fries.* On stumps. A.

M. galericulata, *Scop.* On stumps. A., Q.

Var. **calopus**, *Fries.* On stumps. A.

M. polygramma, *Bull.* On stumps. A., B.

M. dissiliens, *Fries.* Among grass and on a stump. A.

M. atro-cyanea, *Batsch.* Among grass under trees. Q

M. pullata, *Berk. & Cooke.* Among grass. Smell unpleasant. A quaint looking fungus, having the pileus and stem almost black and the gills snow-white. Q.

M. elegans, *Pers.* Among grass. Q.

M. alcalina, *Fries.* On the ground and on stumps and twigs. Q.

M. ammoniaca, *Fries.* Among grass. A.

M. metata, *Fries.* Among short grass. A.

M. vitrea, *Fries.* Among grass. A.

M. stannea, *Fries.* Among short grass. Q.

M. debile, *Fries.* Among moss. Q.

M. vitilis, *Fries.* Among grass. A.

M. tenella, *Fries.* Among short grass. A., P.

M. acicula, *Schaeff.* On leaves and small twigs lying on the ground. B.

M. sanguinolenta, *Alb. & Schw.* Among dead leaves. A.

M. galopoda, *Pers.* On the ground among leaves. A., Q.

Mycena leucogala, *Cke.* On a stump. A peculiar little fungus of a dark purple brown colour; when the stem is broken a white milky-looking fluid exudes in drops. (*Grev.* xi. 41; *Illustr. Brit. Fung.* pl. 653.) A.

M. haematopoda, *Fries.* On dead branches. The stem contains a blood-red fluid which flows out when wounded. Q.

M. cruenta, *Fries.* On the ground. The stem contains a dark red liquid. Q.

M. crocata, *Fries.* On the ground. The stem contains a large quantity of saffron-red juice. Q.

M. epipterygia, *Scop.* Among leaves and on branches lying on the ground. A., Q.

M. pelliculosa, *Fries.* Among grass. A.

M. vulgare, *Pers.* On twigs and on leaves on the ground. A.

M. consimile, *Cke.* Among leaves. (*Grev.* xix. 41; *Illustr. Brit. Fung.* pl. 1186.) Q.

M. citrinella, *Pers.* Among dead leaves. A.

M. rorida, *Fries.* Among leaves and moss and on twigs. A.

M. clavicularis, *Fries.* On fallen twigs. Q.

M. filopes, *Fries.* On the ground. Stem very slender, attached to dead leaves, &c., by a long, downy root. A., Q.

M. saccharifera, *Berk. & Broome.* On dead bramble stems. Q.

M. tenerrima, *Berk.* On twigs and herbaceous stems. B.

M. stylobates, *Pers.* On fallen twigs. A very delicate little white fungus not more than 1–2 lines broad. Base of stem expanded into a broad circular disc. Q.

M. discopoda, *Pers.* On branches, &c. A.

M. corticola, *Schum.* On bark of trees. A.

M. hiemale, *Osbeck.* On bark of trees. A.

Omphalia, *Fries.*

O. hydrogramma, *Fries.* Among leaves under trees. A.

O. maura, *Fries.* Among short grass. A.

O. Postii, *Fries.* On sphagnum in the forcing pits.

O. sphagnicola, *Berk.* On sphagnum in the pits.

O. striaepileus, *Fr.* Among grass. Q.

O. oniscus, *Fries.* On the ground. Q.

O. pyxidata, *Bull.* On banks. A.

O. rustica, *Pers.* On banks. A.

Omphalia hepatica, *Batsch.* On the ground among moss, &c. P.

O. muralis, *Sow.* On dry banks. A.

O. infumata, *Berk. & Broome.* Among grass and moss. A.

O. pseudoandrosacea, *Bull.* Among grass on lawn. Occurring in troops after prolonged rain. A.

O. umbellifera, *L.* On banks. A.

O. retosta, *Fries.* Dry places on the ground. P.

O. griseo-pallida, *Desm.* Among dry grass. A., P.

O. stellata, *Fries.* Rotten wood. Q.

O. camptophylla, *Berk.* On rotten twigs. Q.

O. grisea, *Fries.* On the ground. A., Q.

O. Campanella, *Batsch.* Among moss and short grass. A.

O. Fibula, *Bull.* Among short grass. P.

Var. **Swartzii**, *Fries* Among grass. A.

O. directa, *Berk. & Broome.* On dead leaves. Exceedingly minute, the pileus rarely exceeding half a line in diameter. Q.

O. bullula, *Brig.* On dead twigs. Q.

Pleurotus, *Fries.*

P. corticatus, *Fries.* On trunks. A.

P. ulmarius, *Bull.* On elm trunks. A., P.

P. dryinus, *Pers.* On oak trunk. The largest specimen measured 11 inches across the pileus. Q.

P. tessulatus, *Bull.* On a log. Q.

P. circinnatus, *Fries.* On wood. Q.

P. ostreatus, *Jacq.* On fallen trunks. Many people are prejudiced against fungi growing on wood or stumps, considering that all such are poisonous. This is true of some species ; nevertheless *Pleurotus ostreatus*, the " oyster fungus," so called on account of its cap resembling an oyster shell in shape, always grows on wood, yet it is universally acknowledged as one of the best and safest of edible fungi. Q.

Var. **euosmus**, *Fries.* On trunks. A.

Var. **columbinus**, *Bres.* On stumps. Q.

P. salignus, *Fries.* On willow trunks by the lake. A.

P. sapidus, *Kalchbr.* On elm trunks. Edible. Remarkable for the branched stem, several caps or pilei springing at different points from a common thickened stem.

P. limpidus, *Fries.* On rotten wood lying on the ground. A.

Pleurotus tremulus, *Schaeff.* On rotten wood. A.

P. acerinus, *Fries.* On fallen trunks. Q.

P. acerosus, *Fries.* On gravel paths and on lawns. A.

P. mitis, *Pers.* On fallen branches of various coniferous trees. A.

P. algidus, *Fries.* On wood.

P. septicus, *Fries.* On twigs and decaying *Polyporus.*

P. applicatus, *Batsch.* On rotten wood. A.

P. hypnophilus, *Pers.* On moss. A., P., Q.

P. chioneus, *Pers.* On rotten wood. A.

Hygrophorus, *Fries.*

H. eburneus, *Bull.* Among grass under trees. Q.

H. aureus, *Arrh.* Among grass. A.

H. hypothejus, *Fries.* Among grass. A.

H. cerasinus, *Berk & Broome.* Among grass. A.

H. livido-albus, *Berk & Broome.* Among grass. A.

H. mesotephrus, *Berk & Broome.* On the ground under beeches. Q.

H. olivaceo-albus, *Fries.* On the ground. Q.

H. limacinus, *Fries.* On the ground. Q.

H. pratensis, *Pers.* Among grass in open places. Edible. A.

H. virgineus, *Wulf.* Open grassy places. Edible. A.

Var. **roseipes**, *Mass.* Among grass. A.

H. niveus, *Scop.* Among short grass. Edible. A.

H. cossus, *Sow.* Among short grass. A pure white fungus, having the cap covered with a thick glutinous mass. Smell very strong and unpleasant, resembling that of the larva of the Goat moth—*Cossus ligniperda.* Q.

H. fornicatus, *Fries.* Among grass. Q.

H. distans, *Berk.* Among grass. Q.

H. Clarkii, *Berk. & Broome.* Among grass. A.

H. irrigatus, *Pers.* Among grass. A.

H. ceraceus, *Wulf.* Among grass. A.

H. coccineus, *Schaeff.* Open places among grass and moss. Q.

H. metapodius, *Fries.* Among grass. A.

Hygrophorus calyptraeformis, *Berk.* Among grass in open places. A.

Var. niveus, *Cke.* Among grass. A.

H. chlorophanus, *Fries.* Grassy places. A., P.

H. psittacinus, *Schaeff.* Among short grass. A very pretty fungus, having a blending of yellow, green, and orange in the cap, hence the specific name. A.

H. nitratus, *Pers.* Among grass. Very fragile. Smell very strong, nitrous. A.

H. miniatus, *Fries.* Among short grass. Q.

H. puniceus, *Fries.* Among grass under trees. A.

H. obrusseus, *Fries.* Short grass in open places. A.

H. conicus, *Scop.* Among grass in open places. A showy fungus, having a conical cap of a bright yellow colour with a scarlet tip; every part becoming black when bruised or when old. A.

H. miniatus, *Fries.* Among short grass. A small, very fragile fungus, entirely deep clear crimson, becoming almost white when old. A.

Lactarius, *Fries.*

L. torminosus, *Schaeff.* Among grass. A very elegant fungus of a pale buff colour, and covered, especially near the margin, with shaggy scales. Like all the species of *Lactarius*, this fungus, exudes a quantity of milky-looking fluid when broken. In some species this fluid is white, like milk, in others yellow or red. In some species the liquid is insipid, in others, as the present, very hot, and causing a tingling of the tongue. A.

L. turpis, *Fries.* On the ground under trees. A., P.

L. controversus, *Pers.* Under trees. A.

L. insulsus, *Fries.* Among grass. Milk white, very acrid. A.

L. hysginus, *Fries.* Among grass. Q.

L. trivialis, *Fries.* On the ground. Q.

L. pubescens, *Schrad.* Grassy places. A.

L. blennius, *Fries.* On the ground under trees. A., P.

L. pyrogalus, *Bull.* On the ground under trees. A., Q.

L. quietus, *Fries.* Under trees. Q.

L. flexuosus, *Fries.* On the ground. Milk white, very acrid. Q.

L. aurantiacus, *Fries.* Among grass. A.

L. rufus, *Scop.* Under pines. A.

L. glyciosmus, *Fries.* Under trees. Smell strong, resembling spirit of wine. A., Q.

Lactarius volemus, *Fries.* On the ground under trees. A large fungus, cap and stem deep rusty orange colour. Milk white, abundant, sweet. Edible.

L. serifluus, *DC.* Under trees. A., Q.

L. subdulcis, *Bull.* Among grass under trees. A., Q.

L. camphoratus, *Bull.* Under trees. Smell strong, pleasant, resembling Melilot. A.

L. cimicarius, *Batsch.* Smell heavy and very unpleasant, said to resemble the smell of bugs, hence the specific name.

Russula, *Fries.*

R. nigricans, *Bull.* Among grass. A., Q.

R. albo-nigra, *Kromb.* Among grass. A.

R. adusta, *Fries.* Among grass. A., Q.

R. densifolia, *Gillet.* Under beeches. A.

R. mustelina, *Fries.* Under beeches. A.

R. olivascens, *Fries.* Under oaks. A.

R. furcata, *Fries.* Under trees. A., Q.

Var. **pictipes,** *Cke.* Under trees. A.

Var. **ochroviridis,** *Cke.* Under trees. A.

R. rosacea, *Fries.* Grassy places. A.

R. maculata, *Quélet.* On naked ground under trees. A.

R. sardonia, *Fries.* Among grass. A.

R. purpurea, *Fries.* Under beeches. A.

R. lactea, *Pers.* Under beeches. A.

Var. **incarnata,** *Quélet.* Under beeches. A.

R. virescens, *Schaeff.* Among grass. A.

R. cutefracta, *Cke.* Under pines. A.

R. rubra, *Fries.* Among grass under trees. A., Q.

Var. **sapida,** *Quélet.* Under beeches. A.

R. Linnaei, *Fries.* Under beeches. A.

R. xerampelina, *Schaeff.* Among grass under trees. A., Q.

R. olivacea, *Schaeff.* Under beeches. A.

R. serotina, *Quélet.* Shady places among grass. A.

R. vesca, *Fries.* Among grass under trees. This fungus is edible, and the flavour very good, but as there are so many poisonous species in the genus, it requires knowledge to be certain that you are dealing with the right species. A.

Russula lilacea, *Quélet*. Under various trees. A

R. amoena, *Quélet*. Under trees. Cap very bright but pale purple. A.

R. cyanoxantha, *Schaeff.* Grassy places. A.

R. heterophylla, *Fries*. Among grass under oaks. A.

R. galochroa, *Bull.* Under beeches. A.

R. consobrina, *Fries*. Among grass under trees. A.

Var. **intermedia**, *Cke*. Under beeches. A.

Var. **sororia**, *Fries*. Under beeches. A.

R. foetens, *Pers*. Under trees. Smell strong and very unpleasant. A., Q.

R. subfoetens, *W. G. Smith*. Under beeches. A.

R. fellea, *Fries*. Under trees. Entirely pale straw colour, taste very bitter. Poisonous. A.

R. expallens, *Gillet*. Under trees among grass. A.

R. elegans, *Bres*. Among grass under beeches. A.

R. emetica, *Fries*. Among grass. A very beautiful fungus, cap varying from pale rose-colour to deep crimson, remainder snow-white. Very poisonous, nevertheless it appears to be a favourite food plant for slugs and snails, it being often difficult to find a single specimen out of scores that has not been more or less eaten. A.

Var. **Clusii**, *Fries*. Among grass. A.

Var. **fallax**, *Schaeff.* Among grass. A.

R. fingibilis, *Britz*. Among grass under oaks. A.

R. pectinata, *Bull*. On the ground under trees. A.

R. ochracea, *Fries*. Under trees. A.

R. granulosa, *Cke*. Under trees. A., Q.

R. aeruginea, *Fries*. Among grass. A.

R. citrina, *Gillet*. Grassy and shady places. A.

R. fragilis, *Fries*. Among grass. A.

Var. **niveus**, *Pers*. Under trees among grass and leaves. A.

R. punctata, *Gillet*. Among grass. A.

Var. **leucopus**, *Cke*. Among grass. A.

R. veternosa, *Fries*. Among grass under trees. A.

R. integra, *L*. Among grass under oaks and beeches. A.

R. decolorans, *Fries*. Among grass. A.

Russula Barlae, *Quélet.* Under beeches. A.

Var. **cuprea**, *Kromb.* Under beeches. A.

R. nitida, *Pers.* Among short grass under trees. A., Q

R. alutacea, *Fries.* Under trees. A.

R. armeniaca, *Cke.* Under pines. A.

R. puellaris, *Fries.* Among short grass. A.

Var. **intensior**, *Cke.* Among grass. P.

Var. **roseipes**, *Secr.* Under beeches among grass. A.

R. ochroleuca, *Pers.* Among grass under beeches. A.

R. chamaeleontina, *Fries.* On naked ground under beeches. A.

R. lutea, *Huds.* Among short grass in shady places. A., Q.

R. nauseosa, *Pers.* Among short grass. A.

R. vitellina, *Pers.* Under trees. A.

Cantharellus, *Fries.*

C. cibarius, *Fries.* Under beeches. A thick, fleshy fungus of a uniform pale, dull orange colour, and an agreeable smell, resembling that of apricots. Generally acknowledged throughout Europe as one of the best among edible fungi, if properly prepared. A.

C. aurantiacus, *Fries.* Among short grass in damp places. Somewhat resembling *C. cibarius* in colour and general appearance, but a slenderer plant. Poisonous. A., Q.

C. carbonarius, *Alb. & Schw.* Burnt ground. Q.

C. tubaeformis, *Fries.* On the ground. Q.

C. cinereus, *Fries.* Among grass under beeches. A.

C. infundibuliformis, *Fries.* Among grass. A.

C. muscigenus, *Bull.* On mosses (*Hypnum*). A.

C. lobatus, *Fries.* On mosses. A.

Nyctalis, *Fries.*

N. asterophora, *Fries.* On dead fungi (*Russula nigricans*). Q.

Marasmius, *Fries.*

M. urens, *Fries.* Among grass. A.

M. peronatus, *Bolton.* Among grass. A very common fungus under trees; the stem is shaggy with yellowish down. Taste very pungent; poisonous. A., Q.

M. oreades, *Fries.* Among grass in open places. Popularly known as the "Champignon"; grows in open pastures and often forms "fairy rings." Esteemed as an article of food, or rather as a seasoning in France and Italy. A., P., Q.

Marasmius prasiosmus, *Fries.* Among dead leaves under trees. Q.

M. erythropus, *Pers.* On stumps. Closely resembling *Collybia acervata* in general appearance. Differing in the gills not being crowded together. A., Q.

M. archyropus, *Fries.* Among leaves. A.

M. ramealis, *Bull.* On dead bramble stems. Q.

M. alliaceus, *Jacq.* Among dead leaves. Smell strong, resembling garlic. A.

M. foetidus, *Fries.* On dead branches lying on the ground. Smell very strong and unpleasant. Q.

M. graminum, *Berk.* A small species growing on leaves and culms of dead grass. A.

M. Rotula, *Scop.* On dead twigs lying on the ground. A., Q.

M. androsaceus, *L.* On dead branches. A.

M. insititius, *Fries.* On dead twigs. A., P.

M. Hudsoni, *Pers.* On dead holly leaves. A.

M. epiphyllus, *Fries.* On dead leaves. A., Q.

M. actinophorus, *Berk. & Broome.* On dead fallen twigs. A.

M. saccharinus, *Batsch.* On dead twigs and leaves lying on the ground. A.

Lentinus, *Fries.*

L. tigrinus, *Fries.* On dead wood. A.

L. lepideus, *Fries.* On dead wood. A., Q.

L. cochleatus, *Fries.* On stumps. Has a very agreeable, spicy smell, and is edible. Q.

L. Dunalii, *Fries.* On dead trunk. Q.

Panus, *Fries.*

P. stypticus, *Fries.* On dead logs. A.

P. conchatus, *Fries.* On a poplar trunk. Q.

P. torulosus, *Fries.* On a stump. A very fine fungus when in the full vigour of growth, being clothed with a beautiful purple velvety pile. Q.

Lenzites, *Fries.*

L. betulina, *L.* On stumps. A.

L. abietina, *Fries.* On fir rails. Q.

L. flaccida, *Fries.* On beech trunk. Q.

L. sepiaria, *Fries.* On pine wood. Q.

Hiatula, *Fries.*

*H. **Wynniae**, *Berk. & Broome.* On soil in a stove. Phosphorescent in the dark, emitting a pale greenish light. A native of Ceylon. (*Ann. Mag. Nat. Hist.* 1879, p. 206; *Illustr. Brit. Fung.* pl. 688.)

Volvaria, *Fries.*

V. **bombycina**, *Schaeff.* On living elm trees. A very beautiful fungus, sometimes growing to a large size. A specimen of this fungus growing on a living elm in the grounds weighed $2\frac{3}{4}$ pounds; diameter of cap when expanded, 14 inches; stem, 8 inches long by 2 inches thick; gills, $1\frac{1}{2}$ inches broad. A figure along with the specimen is in the herbarium. A.

V. **gloiocephala**, *Fries.* On the ground. Poisonous. A.

V. **temperata**, *Berk. & Broome.* On soil in a hot-house.

V. **speciosa**, *Fries.* On the ground. Poisonous. A.

Pluteus, *Fries.*

P. **cervinus**, *Schaeff.* On stumps and logs. A.

P. **nanus**, *Pers.* On stumps and on the ground. A., Q.

P. **umbrosus**, *Pers.* On fallen trunk. Q.

P. **leoninus**, *Schaeff.* On stump. A.

P. **chrysophaeus**, *Schaeff.* On fallen branch. Q.

Entoloma, *Fries.*

E. **sinuatum**, *Fries.* On the ground under trees. Poisonous. Q.

E. **jubatum**, *Fries.* On the ground among grass. Q.

E. **sericellum**, *Fries.* On the ground among grass. Q.

E. **clypeatum**, *L.* On the ground under trees. A., P.

E. **speculum**, *Fries.* Among short grass. A., Q.

E. **tortipes**, *Massee.* Among grass. A.

E. **rhodopolium**, *Fries.* On the ground. A.

E. **costatum**, *Fries.* On the ground among grass. A

E. **sericeum**, *Bull.* In grass places. A.

E. **nidorosum**, *Fries.* On the ground under trees. A., Q.

E. **porphyrophaeum**, *Fries.* Among grass. Q.

E. **sinuatum**, *Fries.* On the ground under trees. Poisonous. Q.

Leptonia, *Fries.*

L. **lampropoda**, *Fries.* Among short grass. A.

L. **anatina**, *Lasch.* Among short grass. A.

Leptonia serrulata, *Pers.* Among grass. A., P.

L. chalybea, *Pers.* On stumps. A very beautiful little fungus of a deep blue colour. Q.

L. chloropolia, *Fries.* Among short grass. A.

L. incana, *Fries.* Among grass. A.

L. nefrens, *Fries.* Growing among grass in damp places. Q.

Nolanea, *Fries.*

N. pascua, *Pers.* Among short grass. A., P.

N. mammosa, *Fries.* Among grass. A.

N. nigripes, *Trog.* On the ground in damp place by the lake. Smell very strong and unpleasant, resembling stinking fish. A.

N. verecunda, *Fries.* Among grass. Q.

Eccilia, *Fries.*

E. Acus, *W. G. Smith.* First found amongst germinating coffee seeds in cocoanut fibre, Kew Gardens. It has since been collected in the North of England on pine leaves. A.

E. rhodocylix, *Lasch.* On the ground. A.

E. atropuncta, *Pers.* On the ground under brambles. Q.

Clitopilus, *Fries.*

C. prunulus, *Scop.* Under trees. Smell pleasant, resembling oatmeal. Edible. A.

C. cancrinus, *Fries.* On the ground. A.

C. carneo-albus, *Wither.* Among grass. A.

C. mundulus, *Lasch.* On the ground among fallen leaves. Q.

C. cretatus, *Berk. & Broome.* On the ground. A.

C. straminipes, *Massee.* On the ground. Q.

Claudopus, *W. G. Smith.*

C. variabilis, *Pers.* On twigs. A.

C. depluens, *Batsch.* On wood. A., Q.

C. byssisedus, *Pers.* On wood. A., Q.

Pholiota, *Fries.*

P. togularis, *Bull.* On the ground. A.

P. dura, *Bolton.* On the ground. Q.

P. praecox, *Pers.* Among grass. A., P.

P. erebia, *Fries.* On the ground. A., P.

Pholiota ombrophila, *Fries*. On the ground under trees. Q.

P. sphaleromorpha, *Bull*. Among dead leaves. A.

P. molliscoria, *Cke. & Mass*. Among short grass. A.

P. radicosa, *Bull*. On the ground near trunks. Q.

P. Aegerita, *Fries*. On trunks. Q.

P. squarrosa, *Müll*. On stumps. A.

P. spectabilis, *Fries*. On trunks. Q.

P. adiposa, *Fries*. On trunks. A very beautiful fungus having the cap deep golden yellow and ornamented with darker scales arranged concentrically. Growing in clusters on trunks of living trees, which it eventually kills. Q.

P. mutabilis, *Schaeff*. On logs. A.

P. marginata, *Batsch*. On fallen pine leaves. A.

P. unicolor, *Schum*. On fallen branches. Q.

Inocybe, *Fries*.

I. pyriodora, *Pers*. On the ground under trees. Smell resembles that of ripe pears, hence the specific name. A., Q.

I. incarnata, *Bres*. Among grass under trees. Q.

I. calamistrata, *Fries*. On the ground under pines. Remarkable for the strong smell and in having the base of the stem dark blue. A.

I. dulcamara, *Alb. & Schw*. Under pines. A.

I. scaber, *Müll*. On the ground. A.

I. fasciata, *Cke. & Mass*. A species remarkable in the genus *Inocybe* for growing in dense tufts. (*Grev*. xvii. 52; *Illustr. Brit. Fungi*, pl. 1173.) A.

I. Bongardii, *Weinm*. Among short grass. A.

I. echinata, *Roth*. On soil in the temperate house.

I. scaber, *Fries*. On the ground. Q.

I. fasciata, *Cke. & Mass*. Among grass. Remarkable in the present genus for its cæspitose or tufted habit of growth. A.

I. rimosa, *Bull*. On the ground. Q.

I. asterospora, *Quélet*. On the ground under trees. Superficially closely resembling *Q. rimosa*, Bull. Differing more especially in the globose, warted spores. A.

I. destricta, *Fries*. Under trees. Smell very unpleasant. Q.

I. Trinii, *Weinm*. Among short grass. Smell very pleasant, resembling clove-pinks. A.

Inocybe perbrevis, *Weinm.* Among short grass. A.

I. scabella, *Fries.* On the ground under trees. Varying in colour from pure white to a beautiful pale lilac. A., Q.

I. geophylla, *Sow.* On the ground under trees. A form with a pale bluish-grey pileus is not uncommon; sometimes white. A., P.

I. subrimosa, *Massee.* Among grass. Q.

I. trechispora, *Berk.* Under ferns and brambles. Q.

Hebeloma, *Fries.*

H. fastibile, *Fries.* On the ground under trees. Smell strong and unpleasant; poisonous. A.

H. firmum, *Fries.* On the ground under *Pinus sylvestris.* A.

H. testaceum, *Batsch.* Under trees. Smell quite strong, resembling radishes. Q.

H. elatum, *Fries.* Under pines. Smell resembling radishes. A.

H. claviceps, *Fries.* On the ground. A.

H. mesophaeum, *Fries.* Under fir trees. A.

H. sinapizans, *Fries.* On the ground near stumps. A., Q.

H. nauseosum, *Cooke.* Under trees. Smell very pungent and unpleasant. Q.

H. crustuliniforme, *Bull.* On the ground. Smell strong and unpleasant; poisonous. A.

H. longicaudum, *Pers.* Under trees. Q.

H. petiginosum, *Fries.* On the ground under beeches. A.

Flammula, *Fries.*

***F. purpurata,** *Cke. & Mass.* On tree-fern stems; in the fern-house. (*Grev.* xviii. 73; *Illustr. Brit. Fungi*, pl. 964.)

F. gymnopodia, *Bull.* On the ground. A.

F. lenta, *Pers.* On the ground under trees. Q.

F. spumosa, *Fries.* On buried wood. A.

F. carbonaria, *Fries.* On burnt ground. A.

F. flavida, *Schaeff.* On wood. A., Q., P.

F. mixta, *Fries.* Under pines. A.

F. gummosa, *Lasch.* On an old stump. Q.

F. apicrea, *Fries.* On fallen trunk. Q.

F. ochrochlora, *Fries.* On fallen trunk. Q.

Flammula inopoda, *Fries*. On rotten trunks. This fungus will probably prove to be a species of *Hypholoma*. A.

F. sapinea, *Fries*. Under pines. A.

Naucoria, *Fries*.

N. hamadrya, *Fries*. Among grass. A.

N. cidaris, *Fries*. On the ground in damp places. A.

N. innocua, *Lasch*. On damp ground. Q.

N. pusiola, *Fries*. Among moss. Q.

N. cerodes, *Fries*. Among grass. A.

N. melinoides, *Fries*. Among short grass. A., Q.

N. striaepes, *Cke*. Among grass. This remarkably fine species of *Naucoria* was first observed on a lawn near the herbarium in 1885, and has been noted in the same locality every year since that time. It has also been collected in Yorkshire. (*Grev*. xiii. 60; *Illustr. Brit. Fungi*, pl. 478.) P.

N. pediades, *Fries*. Among short grass. A., P.

N. tabacina, *D.C.* On naked ground. A.

N. temulenta, *Fries*. Among moss and grass. A.

N. badipes, *Fries*. On the ground. A.

N. hydrophila, *Massee*. Damp ground. Q.

N. semiorbicularis, *Bull*. Among short grass. A.

N. latissima, *Cooke*. Among grass. Q.

N. siparia, *Fries*. On dead twigs. Q.

N. conspersa, *Pers*. On the ground. Q.

N. carpophila, *Fries*. On dead beech mast. A.

N. graminicola, *Nees*. On dead grass stems. Q.

Galera, *Fries*.

G. tenera, *Schaeff*. Among grass. A., Q.

G. siliginea, *Fries*. On the ground under ferns, &c. Q.

G. rubiginosa, *Pers*. On the ground among moss.

G. Hypnorum, *Batsch*. Among grass, common everywhere.

Var. **Bryorum**, *Pers*. Among moss and grass. A.

G. miniophila, *Lasch*. Among moss. Q.

G. ravida, *Fries*. On chips. Q.

G. spartea, *Fries*. Among moss. Q.

Tubaria, *Fries.*

T. furfuracea, *Pers.* On twigs and chips. A.

T. crobula, *Fries.* On fallen branches. A.

T. paludosa, *Fries.* Among moss, &c., edge of lake. A.

T. muscorum, *Pers.* Among moss on a tree trunk. Q.

T. inquilina, *Fries.* On fragments of rotten wood lying on the ground. Q.

Crepidotus, *Fries.*

C. mollis, *Schaeff.* On decaying trunks. Q.

C. epibryus, *Fries.* Growing on living plants of *Hypnum purum.* L., A.

C. Rubi, *Berk.* On dead bramble stems. Q.

C. epigaeus, *Pers.* On the ground. A.

Chitonia, *Fries.*

*__C. rubriceps__, *Cke. & Mass.* On soil in the aroid house. A very remarkable fungus, the first European representative of the genus. In all probability imported with soil or plants from the southern hemisphere. (*Grev.* xv. 57; *Illustr. Brit. Fungi*, pl. 967.)

Bolbitius, *Fries.*

B. tener, *Berk.* Among grass. A.

B. grandiusculus, *Cke. & Mass.* Among grass. A.

B. vitellinus, *Fries.* On dung. Kew Green.

B. flavidus, *Bolton.* On horse-dung. A.

B. titubans, *Fries.* Among short grass. Q.

B. tener, *Berk.* Among grass. Q.

Cortinarius, *Fries.*

C. saturninus, *Fries.* Among grass under trees. Q.

C. isabellinus, *Fries.* Under pines. A.

C. scandens, *Fries.* Under pines. P.

C. decipiens, *Fries.* Under trees. Q.

C. acutus, *Fries.* Under trees. Q.

C. evernius, *Fries.* Under pines. P.

C. armillatus, *Fries.* A large and robust fungus, readily known by the presence of three or four oblique zones of a vermilion colour encircling the stem. Under trees. Q.

Cortinarius iliopodius, *Fries*. Under trees. Q.

C. glaucopus, *Fries*. On the ground under trees. Q.

C. coerulescens, *Fries*. Under trees. A.

C. purpurascens, *Fries*. Among grass under trees. Q.

C. mucifluus, *Fries*. Under trees. A.

C. ochroleucus, *Schaeff.* Among grass. The most abundant species of this large genus, which is but sparsely represented in the grounds. A.

C. cinnamomeus, *Fries*. Under trees. Q.

C. torvus, *Fries*. Among grass under trees. There is some difference of opinion in different European countries as to this species; but specimens from Kew were submitted to Fries, who stated that they exactly represented his idea of the species. Q.

C. testaceus, *Cooke*. On the ground. Q.

C. hinnuleus, *Fries*. Under trees. A.

C. leucopus, *Bull*. Among grass. A small form of this species having the pileus about 1·5 cm. across is not uncommon. A.

C. castaneus, *Fries*. On the ground. A single specimen, so far as I am aware, has only been collected. A.

Paxillus, *Fries*.

P. orcelloides, *Cke. & Mass.* On the ground among grass. (*Grev.* xvi. 46; *Illustr. Brit. Fungi*, pl. 874.) Q.

P. panaeolus, *Fries*. On the ground. Q.

P. lividus, *Cooke*. Under trees. Q.

P. involutus, *Batsch*. On the ground; common everywhere. Edible.

P. leptopus, *Fries*. On rotten wood. Q.

Agaricus, *L*.

A. campestris, *L*. Among grass. This is usually considered as the most delicious of all edible fungi, and is generally spoken of as the meadow mushroom. Although supposed to be the only species sold, it is in reality rare in the market as a cultivated species. A.

A. augustus, *Fries*. Naked soil. This beautiful species occurred in abundance one season. It is larger and the flavour much superior to that of the common mushroom. A.

A. arvensis, *Schaeff.* Among grass. It is to be found every season under elm trees. Edible, and by some considered superior to the mushroom. Popularly known as the horse mushroom. P.

A. silvaticus, *Schaeff.* On the ground. Q.

Agaricus haemorrhoidarius, *Schulzer.* On the ground. Q.

A. comptulus, *Fries.* Among grass. A.

A. sagatus, *Fries.* Under trees. A.

A. russiophyllus, *Fries.* Among grass. A.

Stropharia, *Fries.*

S. Coronilla, *Bull.* Among grass. A neat little fungus, superficially closely resembling *Agaricus comptulus*, but distinguished by the gills being attached to the stem. Poisonous. A., P.

S. squamosa, *Fries.* On heaps of leaves and decaying vegetable matter in damp places.

S. thrausta, *Kalchb.* On decaying vegetable matter, and on the ground in damp places. A., Q.

S. inuncta, *Fries.* Among grass. P.

S. ventricosa, *Massee.* On the ground in clusters. A.

S. catarium, *Pers.* On the ground. Q.

S. melasperma, *Bull.* Among grass. Q.

S. merdaria, *Fries.* On dung. A.

S. stercoraria, *Fries.* On dung. A., P.

S. aeruginosa, *Curtis.* Among grass. Common. Poisonous.

S. semiglobata, *Batsch.* On dung. Poisonous. A., P.

Hypholoma, *Fries.*

H. sublateritium, *Fries.* On stumps. Poisonous. A., Q.

Var. **squamosum**, *Cke.* On stumps. A.

H. epixanthum, *Fries.* On stumps. Q.

H. fasciculare, *Hudson.* On and around stumps. Common. Poisonous.

Var. **eleodes**, *Fries.* On stumps. A.

H. dispersum, *Fries.* On the ground. Q.

H. velutinum, *Pers.* On the ground near decaying wood. A., Q.

H. pyrotrichum, *Holms.* On the ground. A.

H. candolleanum, *Fries.* On stumps and buried wood. A., B., Q.

H. appendiculatum, *Bull.* On rotten wood. Common.

H. catarium, *Fries.* On the ground. A.

H. capnoides, *Fries.* On the ground near stumps. Q.

H. hydrophilum, *Bull.* On the ground A.

Psilocybe, *Fries.*

P. **semilanceata**, *Fries.* Among short grass. Common. Poisonous.

Var. **coerulescens**, *Cke.* Among grass. Differs from the typical form only in being blue or greenish at the base of the stem. A.

P. **ericaea**, *Pers.* Among grass in low damp places. P.

P. **physalodes**, *Bull.* On manured ground. P.

P. **atro-rufa**, *Fries.* On soil in the temperate house.

P. **cernua**, *Müll.* On the ground among heaps of dead leaves. Q.

P. **spadicea**, *Schaeff.* On the naked ground. A.

P. **foenisecii**, *Pers.* Among grass. Common.

Psathyra, *Fries.*

P. **corrugis**, *Pers.* On naked soil. A. Among grass. Q

Var. **vinosus**, *Corda.* Melon yard.

P. **semivestita**, *Berk. & Broome.* Among grass. It is only during the young state that the pileus is covered with white, floccose down ; when fully developed it is usually quite naked. A.

P. **elata**, *Massee.* A very beautiful fungus, with a bell-shaped, rich brown pileus and a silvery-white stem six to seven inches long. Growing in dense clusters. On the ground. Q.

P. **neglecta**, *Massee.* On the ground. A.

Panaeolus, *Fries.*

P. **egregius**, *Mass.* Among grass. A.

P. **fimiputris**, *Bull.* On dung. A., P.

P. **retirugis**, *Batsch.* On dung. A.

P. **campanulatus**, *L.* Among grass. Common.

P. **papilionaceus**, *Bull.* Among grass. Common.

P. **leucophanes**, *Berk. & Broome.* Among grass. A.

P. **phalenarum**, *Fries.* On horse dung. A.

P. **fimicola**, *Fries.* On manured ground. P.

Anellaria, *Karsten.*

A. **separata**, *Karsten.* On dung. A., P.

A. **fimiputris**, *Karsten.* On dung. Common.

Psathyrella, *Fries.*

P. **gracilis**, *Fries.* On naked ground under hedges &c. A.

P. **subatrata**, *Fries.* On the ground. A.

Psathyrella hiascens, *Fries.* On the ground under trees. A.

P. atomata, *Fries.* On the ground under hedges, &c. Common.

P. disseminata, *Fries.* On decaying trunks and stumps. A., Q.

Coprinus, *Fries.*

C. comatus, *Fries.* On rich soil and on heaps of decayed leaves. A very elegant fungus when well developed, some specimens attaining a height of 14 inches. One of the best and safest of edible fungi. A figure of this species is exhibited in No. 2 museum. A., Q.

C. sterquilinus, *Fries.* On dung and rich soil. A., P.

C. atramentarius, *Fries.* On the ground near decaying wood. Common. Edible, but not equal in flavour to *Coprinus comatus.*

C. soboliferus, *Fries.* On the ground. Probably only a variety of *C. atramentarius.* Edible. P.

C. fimetarius, *Fries.* On manure heaps, &c. Common.

C. niveus, *Fries.* On dung. Common.

C. micaceus, *Fries.* On the ground near stumps, posts, &c. Growing in dense clusters; the pileus when young is thickly dusted with glittering particles resembling fragments of mica.

C. fuscescens, *Fries.* On the ground. A.

Var. **rimoso-squamosus**, *Cooke.* On the ground at the base of a stump. A.

C. congregatus, *Bull.* On soil in the temperate house.

C. deliquescens, *Bull.* On trunks, heaps of decaying leaves, &c. Common.

C. tardus, *Karsten.* On the ground near buried wood. A.

C. tuberosus, *Quélet.* On dung. An interesting little species, springing from a small black sclerotium. The sclerotia were found by Mr. G. Nicholson; the sporophores appeared a week after the sclerotia were placed in damp earth. This is the first British record for this species, which was established by Quélet from French specimens (*Bull. Soc. Bot. France*, xxiv. 289, pl. 3, 1877). B.

C. Hendersoni, *Berk.* On soil in hot-beds.

C. Lagopus, *Fries.* On rich soil. A., P.

C. pellucidus, *Karsten.* On soil in a propagating pit.

C. radiatus, *Fries.* On dung. Common. A very minute and delicate fungus lasting only a few hours; only about 2 lines across.

Coprinus stercorarius, *Fries.* On dung, rich soil, &c. Common.

C. ephemerus, *Fries.* On manure heaps, &c. Common.

C. velox, *Godey.* On horse-dung.

C. Gibbsii, *Mass. & Crossl.* Cultivated in the herbarium on horse-dung received from Yorkshire. This species is the smallest Agaric known, being only about $\frac{1}{10}$th of an inch across.

POLYPOREAE.

Boletus, *Dill.*

B. luteus, *L.* Under pines. A.

B. elegans, *Schum.* Under pines. A.

B. flavus, *With.* On the ground under trees. A.

B. chrysenteron, *Fries.* On the ground. The most abundant species in the grounds. Very handsome, with its olive cap and bright lemon-yellow under-surface. Poisonous.

B. subtomentosus. *L.* On the ground. Common.

B. cruentus, *Vent.* On the ground under beeches. Smell strong; flesh changing to red when cut or bruised. A.

B. impolitus, *Fries.* Under trees. A.

> Var. **nanus**, *Massee.* A small form, only about 1 in. across, also differs from the typical form in having the opening of the tubes sinuous.

B. fulvidus, *Fries.* Under trees. A.

B. castaneus, *Bull.* Under trees. A rare fungus, readily recognised by the minutely velvety pale chestnut-coloured pileus and stem. A.

B. spadiceus, *Schaeff.* Under trees. A.

B. radicans, *Pers.* Under trees. A.

B. duriusculus, *Schulzer.* On the ground. The flesh turns copper-coloured when cut or bruised. A.

B. radicans, *Pers.* Among grass under trees. A.

B. badius, *L.* Among grass. A., Q.

B. bovinus, *L.* Under pines. A.

B. granulatus, *L.* Under trees. Edible. A.

B. tenuipes, *Cke.* Under beeches. A.

B. regius, *Kromb.* Among grass. A very beautiful fungus with a bun-shaped rose-coloured cap or pileus four to six inches across. A.

B. fragrans, *Vitt.* Remarkable amongst species of *Boletus* for growing in dense clusters. Edible.

Boletus luridus, *Schaeff.* On the ground under trees. A common species in the grounds, readily known by the dark olive-green pileus, and the blood-red under-surface and stout stem. The pale yellow flesh instantly changes to a deep indigo-blue colour when broken. Poisonous. A., Q.

B. edulis, *Bull.* On the ground. The cap or pileus resembles a penny bun in shape, size, and colour. Edible. Q.

B. purpureus, *Fries.* Under trees. A.

B. vaccinus, *Fries.* Under beech trees. A.

B. rubinus, *W. G. Smith.* Under beeches. A.

B. viscidus, *L.* Under trees. Q.

B. laricinus, *Berk.* Under pines. A.

B. scaber, *Fries.* Among grass. Edible. A., Q.

B. caespitosus, *Mass.* Among grass under trees. Growing in dense clusters. (*Brit. Fungus-Flora*, i. 297.) A.

Fistulina, *Bull.*

F. Hepatica, *Fries.* On living trunks of old oak trees. When well grown forming large flaps weighing 1 lb. to 2 lbs. each. Texture fibrous and resembling raw beef when cut in slices, hence the popular name beefsteak fungus. Edible. A., B.

Polyporus, *Micheli.*

P. rufescens, *Fries.* On stumps. Q.

P. squamosus, *Fries.* On living trunks of various trees. Common. An elegant fungus, but a destructive parasite.

P. melanopus, *Fries.* On buried wood. A.

P. picipes, *Fries.* On willow trunks. A., Q.

P. varius, *Fries* On fallen trunks and stumps. A., P.

P. elegans, *Fries.* On birch trunk. Q.

Var. **nummularius,** *Fries.* On fallen trunks. Q.

P. giganteus, *Fries.* At the base of trunks. The large overlapping pilei often form patches two to three feet across. A.

P. sulphureus, *Fries.* On living trunks of various trees. Common. Distinguished by the bright sulphur colour of every part, and the very disagreeable smell. A destructive parasite to trees.

P. salignus, *Fries.* On willow trunks, which are destroyed by it. A.

P. dryadeus, *Fries.* Parasitic on oak trunks, usually growing near the base. A.

P. hispidus, *Fries.* On living trunks of various trees. A very destructive parasite. A., Q.

Polyporus cuticularis, *Fries.* On beech trunk. A parasitic species. A.

P. mollis, *Fries.* On dead pine wood. Q.

P. rutilans, *Fries.* On dead elm branches. Smell pleasant, resembling aniseed. Q.

P. Destructor, *Fries.* On worked wood, which it destroys.

P. betulinus, *Fries.* Parasitic on birch trunks. Q.

P. fumosus, *Fries.* On stumps. Q.

P. adustus, *Fries.* On trunks, stumps, &c. Common.

P. chioneus, *Fries.* On pine trunks. A.

P. caesius, *Fries.* On decayed pine trunk. Q.

P. armeniacus, *Berk.* On stumps and dead wood. Pure white when growing, changing to a bright cinnamon colour when dry. Q.

P. fragilis, *Fries.* On rotten pine wood. Soft, white, spotted with brown when bruised. Q.

Fomes, *Fries.*

F. lucidus, *Fries.* On decaying trunks. Reddish-chestnut colour ; the pileus gives out a viscid secretion which soon hardens, when it presents the appearance of having been varnished. A.

F. ulmarius, *Fries.* On old elm trunks. A.

F. connatus, *Fries.* On old trunks. Q.

F. roseus, *Fries.* On an old post. Dingy rose colour both outside and inside. Q.

F. igniarius, *Fries.* On living beech trunk. Differs from *P. fomentarius*, Fr., in the very hard flesh and hyaline spores, A destructive parasite, attacking many kinds of trees. A.

F. fomentarius, *Fries.* On living trunks of various trees, which it eventually kills if not removed. The substance of this fungus was at one time used for making tinder ; at the present day it is manufactured into a felt-like material, which is used for making a great variety of articles, as chest preservers, purses, slippers, caps, &c. A selection of articles manufactured from this material are exhibited in No. 2 museum. A., P.

F. nigricans, *Fries.* On living birch trunk. A parasitic species. Q.

F. salicinus, *Fries.* On willow trunks. A.

F. fraxineus, *Fries.* On old ash trunks. A.

F. annosus, *Fries.* Base of trunks, stumps, &c. A very destructive fungus, especially to Conifers. Q.

F. applanatus, *Fries.* On dead trunks. Q.

F. conchatus, *Fries.* On willow trunks. A.

F. ferruginosus, *Mass.* On dead trunks, posts, &c. A., Q.

Polystictus, *Fries.*

P. perennis, *Fries.* On the ground, under beeches. A.

P. versicolor, *Fries.* On dead trunks, stumps, &c. Common.

P. hirsutus, *Fries.* On trunks, posts, &c. Common.

P. velutinus, *Fries.* On trunks and stumps. Common.

P. abietinus, *Fries.* On decaying fir tree. A.

P. radiatus, *Fries.* On dead branches. Q.

Poria, *Pers.*

P. vapoaria, *Fries.* On fallen branches. Common. Usually a saprophyte, but sometimes becoming parasitic, and destroying Conifers.

P. Medulla-panis, *Fries.* On rotten wood. Q.

P. blepharistoma, *Berk. & Broome.* On dead wood. A., P.

P. sanguinolenta, *Alb. & Schw.* On dead wood. A.

P. vulgaris, *Fries.* On dead branches. Q.

P. hibernica, *Berk. & Broome.* On pine boards in a greenhouse.

P. farinella, *Fries.* On dead branches of beech. A.

P. viridans, *Berk.* On rotten wood. A.

P. terrestris, *Fries.* On naked ground. Q.

Trametes, *Fries.*

T. gibbosa, *Fries.* On stumps. Q.

T. serpens, *Fries.* On fallen bark. Q.

T. suaveolens, *Fries.* On trunk. Smell pleasant, resembling aniseed. Q.

Daedalea, *Pers.*

D. quercina, *Pers.* On oak stumps. A

D. unicolor, *Fries.* On posts. Q.

D. latissima, *Fries.* On dead wood. Q.

Merulius, *Hall.*

M. lacrymans, *Fries.* On old boards. Popularly known as "dry-rot." Very rare in woods, but too well known for the destruction it causes with worked timber in badly ventilated places. Fine specimens of this fungus are exhibited in No. 2 museum.

M. Corium, *Fries.* On dead branches. Q.

Merulius tremellosus, *Schrad.* On dead wood. P.

M. serpens, *Tode.* On rotten pine board. A.

M. molluscus, *Fries.* On dead wood. Q.

M. aurantiacus, *Klotzsch.* On a stump. Q.

HYDNEAE.

Hydnum, *L.*

H. Weinmanni, *Fries.* On rotten poplar. Q.

H. alutaceum, *Fries.* On rotten wood. A.

H. viride, *Fries.* On rotten wood. A.

H. niveum, *Pers.* On dead wood. A., Q.

H. farinaceum, *Pers.* On rotten pine boards. A.

H. molluscum, *Fries.* On dead wood. Q.

H. melleum, *Berk. & Broome.* On worked wood. A.

H. udum, *Fries.* On fallen branches. Q.

Caldesiella, *Saccardo.*

C. ferruginosa, *Saccardo.* On dead wood. A.

Irpex, *Fries.*

I. fusco-violaceus, *Fries.* On pine trunks. This fungus is said to become parasitic on pines. It is doubtful as to whether this species is more than a form of *Polystictus abietinus* with torn pores. A.

I. obliquus, *Fries.* On stumps. Q.

Radulum, *Fries.*

R. quercinum, *Fries.* On dead oak branches. A.

R. pendulum, *Fries.* On birch trunk. Q.

R. orbiculare, *Fries.* On dead bark of various trees. A.

Phlebia, *Fries.*

P. vaga, *Fries.* On dead wood. Q.

P. radiata, *Fries.* On dead wood. Q.

P. merismoides, *Fries.* On dead wood. Q.

P. contorta, *Fries.* On fallen trunk. Q.

Grandinia, *Fries.*

G. granulosa, *Fries.* On fallen branches. A.

G. crustosa, *Fries.* On dead wood. A.

Odontia, *Pers.*

O. fimbriata, *Pers.* On fallen branches. Q.

Kneiffia, *Fries.*

K. setigera, *Fries.* On fallen branches. A.

THELEPHOREAE.

Solenia, *Hoffmann.*

S. fasciculata, *Pers.* On dead wood. B.

Cyphella, *Fries.*

C. capula, *Fries.* On dead bramble stem. Q.

C. albo-violacea, *Karsten.* On dead bark. B.

C. villosa, *Karsten.* On rotten twigs. A.

C. muscigena, *Fries.* On living *Hypnum.* A.

C. lacera, *Fries.* On fallen twigs. Q.

Craterellus, *Fries.*

C. cornucopioides, *Pers.* On the ground. A quaint-looking fungus, resembling a black funnel with a wavy margin. Edible, and with an excellent flavour. Q.

Stereum, *Pers.*

S. spadiceum, *Fries.* On dead branches. Common.

S. rugosum, *Fries.* On dead branches. Common.

S. sanguinolentum, *Fries.* On decaying pine plank. The hymenium becomes blood-red when scratched or bruised. A.

S. purpureum, *Pers.* On dead trunks or branches. Common.

S. ochroleucum, *Fries.* On dead bark, especially of *Aesculus Hippocastanum.* A.

S. hirsutum, *Fries.* On dead trunks, branches, &c. Common. Is sometimes a destructive parasite on trees.

S. undulatum, *Massee.* On the ground. Q.

S. frustulosum, *Fries.* On dead bark. Q.

S. acerinum, *Fries.* On bark. Q.

Corticium, *Pers.*

C. comedens, *Fries.* On branches. Common. Developing under the bark, which is eventually thrown off. A parasite.

Corticium coeruleum, *Fries.* On old posts. Of a beautiful clear blue colour, and with a silky sheen when well developed. One of the few British fungi that are phosphorescent, emitting a pale bluish light in the dark. A.

***C. flaveolum,** *Mass.* On trunk of a tree-fern in the temperate house. Probably an introduced species.

C. sanguineum, *Fries.* On fallen branches. Q.

C. polygonium, *Fries.* On decaying bark. Q.

C. molle, *Fries.* On pine bark. A.

C. roseolum, *Mass.* On old worked wood. A.

C. lacunosum, *Berk. & Broome.* On dead wood. A.

C. Sambuci, *Fries.* On bark of *Sambucus nigra.* Q.

C. arachnoideum, *Berk.* On dead wood branches, &c. A., Q.

C. confluens, *Fries.* On bark of *Fagus sylvatica.* A.

C. lacteum, *Fries.* On wood. A.

C. Lycii, *Cke.* On *Lycium.* P.

C. populinum, *Fries.* On poplar bark. A.

C. violaceo-lividum, *Fries.* On dead wood. Q.

C. radiosum, *Fries.* On rotten wood. Q.

C. lactescens, *Berk.* On oak trunk. A peculiar species forming broadly effused whitish patches. A quantity of white latex escapes when the flesh of the fungus is cut or bruised. Q.

C. scutellare, *Berk. & Curt.* On wood. Q.

C. porosum, *Berk. & Curt.* On wood. Q.

Hymenochaete, *Lév.*

H. rubiginosa, *Lév.* On decorticated wood. A.

H. leonina, *Berk. & Curt.* On dead wood. A.

H. corrugata, *Lév.* On dead wood. A.

H. tabacina, *Lév.* On fallen trunk. Surface very minutely velvety, varying in colour from rusty-bay to deep purple-brown or mulberry colour. Q.

Peniophora, *Cke.*

P. quercina, *Cke.* On oak branches. A.

P. gigantea, *Mass.* On pine bark. A.

P. pezizoides, *Mass.* On dead branches of *Aesculus Hippocastanum.* A.

P. pubera, *Massee.* On dead bark. Q.

Peniophora rosea, *Mass.* On wood. A.

P. incarnata, *Mass.* On wood and bark. A., P.

P. ochracea, *Mass.* Inside dead bark. Q.

P. cinerea, *Cke.* On bark and wood. Common.

P. velutina, *Cke.* On wood. A., Q.

P. phyllophila, *Mass.* On dead leaves. A.

P. terrestris, *Mass.* Running over branches, leaves, and the naked ground. A.

Soppittiella, *Mass.*

S. cristata, *Mass.* On the ground, incrusting leaves, moss, &c. Q.

S. sebacea, *Mass.* Running over various substances lying on the ground. A.

Thelephora, *Ehrh.*

T. caryophyllea, *Pers.* On the ground. A.

T. biennis, *Fries.* On the ground. A.

T. terrestris, *Ehrh.* On the ground under pines. A.

T. laciniata, *Pers.* On the ground under pines. A.

Coniophora, *DC.*

C. olivacea, *Mass.* On dead pine trunk. Q.

C. arida, *Karsten.* On dead pine wood. Q.

C. sulphurea, *Mass.* Running over heaps of dead leaves. A.

C. ochracea, *Mass.* On the inside of elm bark. Q.

C. pulverulenta, *Mass.* On dead wood. Q.

C. membranacea, *DC.* On damp wall of a potting shed.

C. incrustans, *Mass.* Running over heaps of dead leaves. Q.

C. puteana, *Mass.* On dead bark. A.

Aldridgea, *Massee.*

A. gelatinosa, *Massee.* On a heap of dead leaves. Forming a broadly effused, thickish subgelatinous purple-brown layer, which shrinks very much during drying. A.

CLAVARIEAE.

Clavaria, *Vaillant.*

C. muscoides, *L.* Among grass. A.

C. fastigiata, *L.* Among grass. A.

Clavaria kewensis, *Mass.* On stump. Smell pleasant, resembling that of aniseed. B.

C. coralloides, *L.* On the ground under trees. Q.

C. cinerea, *Bull.* On the ground. A.

C. cristata, *Holmsk.* Under trees. Edible. Q.

C. rugosa, *Bull.* Under trees. P., Q.

C. fusiformis, *Sow.* Under trees. Q.

C. inaequalis, *Fl. Dan.* Among grass. A.

C. argillacea, *Fries.* Among grass. A.

C. vermicularis, *Scop.* Among grass. Edible, taste resembling that of cheese-straws. A.

C. flaccida, *Fries.* On the ground among moss, &c. Superficially much resembling *C. abietina*, Schum., differing however in the smaller spores, and in not changing to a dull green colour when bruised. Q.

C. fragilis, *Holmsk.* Among grass. A., Q.

C. uncialis, *Grev.* On dead stems of various Umbellifers. Q.

Typhula, *Pers.*

T. erythropus, *Fries.* On dead herbaceous stems. Q.

T. pusilla, *Schröt.* On dead poplar leaves. A.

T. gracilis, *Berk.* On dead leaves. Q.

T. phacorrhiza, *Fries.* On dead herbaceous stems. B.

Pistillaria, *Fries.*

P. micans, *Fries.* On dead thistle stems. Q.

P. culmigena, *Fries.* On dead grass. Q.

P. furcata, *W. G. Sm.* On soil in the temperate house.

P. quisquilaris, *Fries.* On dead herbaceous stems. Q.

DACRYOMYCETEAE.

Dacryomyces, *Nees.*

D. deliquescens, *Duby.* On pine rails, &c. Common.

D. stillatus, *Nees.* On dead, damp wood. Common.

D. chrysocomus, *Fries.* On soft decayed pine wood. A.

D. succineus, *Fries.* On fallen pine leaves. A.

D. torta, *Massee.* On fallen decorticated oak branches. A.

Dacryopsis, *Massee.*

D. nuda, *Massee.* On pine stump. A.

Ditiola, *Fries.*

D. radicata, *Fries.* On rotten wood A.

Calocera, *Fries.*

C. viscosa, *Fries.* On oak wood. A., Q.

C. stricta, *Fries.* On wood. Q.

C. striata, *Fries.* On trunks. A.

TREMELLINEAE.

Tremella, *Dill.*

T. lutescens, *Pers.* On a stump. A.

T. mesenterica, *Retz.* On dead branches. Common.

T. frondosa, *Fries.* On fallen trunk. Q.

T. Tubercularia, *Berk.* On fallen oak branches. A.

T. intumescens, *Eng. Bot.* On dead beech trunk. Q.

T. epigaea, *Berk. & Broome.* On naked ground in damp places. Q.

Naematelia, *Fries.*

N. encephala, *Fries.* On a pine rail. Q.

N. nucleata, *Fries.* On rotten branches.

Exidia, *Fries.*

E. glandulosa, *Fries.* On dead oak branches. A peculiar looking, black, gelatinous fungus, popularly known as "witches' butter." A.

E. albida, *Brefeld.* On dead branches. Q.

Ulocolla, *Bref.*

U. saccharina, *Bref.* On dead pine wood. A.

U. foliacea, *Bref.* On stumps. Q.

AURICULARIEAE.

Auricularia, *Bull.*

A. mesenterica, *Fries.* On dead trunks. Common.

A. lobata. *Sommerf.* On trunk. A.

Hirneola, *Fries.*

H. Auricula-judae, *Berk.* On dead branches of *Sambucus nigra.* Q.

GASTROMYCETES.

PHALLOIDEAE.

Aseröe, *La Bill.*

***A. rubra,** *La Bill.* On soil in a stove. A very beautiful fungus, resembling a stalked sea-anemone. The stem is pure white and the spreading rays bright crimson. As is usual in the members of the present family, the very minute spores are immersed in mucus, which has a sweet taste and a very disagreeable smell. Numerous flies are attracted by the smell, and readily eat the mucus, and by this means the spores are dispersed. An introduced species; a native of Queensland. (*Kew Bull.* 1897, *Pl.* 2, *f.* 1.)

Phallus, *Micheli.*

P. impudicus, *L.* On the ground. Readily detected by the smell, which is very offensive and observable at a distance. A., Q.

Mutinus, *Fries.*

M. caninus, *Fries.* On the ground. Smell only slight. A., Q.

LYCOPERDEAE.

Lycoperdon, *Tournefort.*

L. echinatum, *Pers.* On the ground. A.

L. atropurpureum, *Vitt.* Under trees. Q.

L. saccatum, *Vahl.* Among grass under trees. Common.

L. excipuliforme, *Scop.* On the ground. Q.

L. perlatum, *Pers.* On the ground under brambles and ferns. Q.

L. gemmatum, *Batsch.* Among grass under trees. Common.

L. pyriforme, *Schæff.* On rotten wood. Common.

L. coelatum, *Bull.* Among grass. A., P.

L. Bovista, *L.* Among grass. The largest British puff-ball, sometimes reaching a diameter of 12 inches. Edible, having a very delicate flavour. A.

Bovista, *Dill.*

B. plumbea, *Berk.* Among grass. Common.

B. nigrescens, *Vitt.* Among grass. Common.

B. pusilla, *Mass.* Among grass. A.

B. ovalispora, *Cke. & Mass.* Among grass. A.

Geaster, *Micheli.*

G. hygrometricus, *Pers.* On the ground. A.

G. fornicatus, *Fries.* On the ground. Q.

SCLERODERMEAE.

Scleroderma, *Pers.*

S. vulgare, *Fries.* On the ground under trees. Common.

S. verrucosum, *Pers.* On the ground. Common.

S. Bovista, *Fries.* On the ground. A., Q.

S. Geaster, *Fries.* On the ground. The species of *Scleroderma* are often mistaken for truffles, but are quite distinct, and are not edible. The Tuberaceæ or truffle family are absent from the grounds. A., Q.

Quéletia, *Fries.*

***Q. mirabilis,** *Fries.* On the ground under trees. For an account of the introduction of this interesting fungus, see *Grevillea*, xxii. (1893), 42. A.

NIDULARIEAE.

Cyathus, *Haller.*

C. striatus, *Hoffm.* On twigs and wood on the ground. Common. This species, along with the next, are popularly known as the "birds'-nest fungus."

C. vernicosus, *DC.* On the ground. Common.

Crucibulum, *Tul.*

C. vulgare, *Tul.* On wood and twigs. A.

Nidularia, *Tul.*

N. pisiformis. *Tul.* On wood. A.

Sphaerobolus, *Tode.*

S. stellatus, *Tode.* On damp wood in a plant house. A minute but very beautiful fungus, at first ball-shaped, then splitting above into several teeth, and ejecting to some distance a little yellow ball containing the spores.

Thelebolus, *Tode.*

T. terrestris, *Alb. & Schw.* On heaps of dead leaves. A.

ASCOMYCETES.

GYMNOASCEAE.

Endomyces, *Van Tiegh.*

E. coprophilus. *Mass & Salm.* On horse-dung.

Arachinotus, *Schroet.*

A. ruber, *Schroet.* On dog's dung.

A. candidus, *Schroet.* On an old deserted bee's nest.

Gymnoascus, *Baran.*

G. Reessii, *Baran.* On dung of rabbit.

G. setosus, *Eidam.* On an old bee's nest.

Myxotrichum, *Kunze.*

M. uncinatum, *Kunze.* On rabbit-dung,

M. chartarum, *Kunze.* On rat's dung. A very beautiful object under a low power of the microscope. The minute spherical perithecia consist of an open irregular network of interwoven branches from which radiate in every direction, numerous long slender spines, each one curled at the tip like a shepherd's crook.

PYRENOMYCETES.

ERYSIPHEAE.

All the species belonging to this family are parasites, and in some instances very destructive to cultivated crops. They appear under the form of a delicate white film on living leaves.

Podosphaera, *Kunze.*

P. Oxyacanthae, *De Bary.* On living leaves of *Crataegus.* Common.

Var. **tridactyla**, *Salm.* On living leaves of various species of *Prunus.* Common.

Sphaerotheca, *Lév.*

S. pannosa, *Lév.* On leaves, young shoots, flowers, and fruit of cultivated roses. A dangerous enemy to roses, causing the foliage to drop prematurely.

S. humuli, *Burr.* On meadow-sweet, wild hop, agrimony, willow-herb, *Poterium sitchense.*

Var. **fuliginea**, *Salm.* On dandelion.

Phyllactinia, *Lév.*

P. corylea, *Karst.* On *Betula alba* and *Cornus sanguinea.*

Uncinula, *Lév.*

U. clandestina, *Schroet.* The claim of this species to be considered as British rests on the authority of Cooke, who records it (*Kew Bulletin*, 1897, p. 138) as growing on elm—*Ulmus campestris*—in the Royal Gardens, Kew; I cannot, however, find specimens from this locality in this author's herbarium at Kew. (*Salm. Mon.*, p. 98).

U. adunca, *Lév.* On leaves of *Populus nigra.*

U. spiralis, *Berk. & Cooke.* On living vine leaves.

U. Prunastri, *Sacc.* On leaves of *Prunus spinosa.*

U. Aceris, *Sacc.* On living leaves of *Acer Pseudoplatanus.*

U. Prunastri, *Saccardo.* On leaves of *Prunus spinosa.*

Microsphaera, *Lév.*

M. Dubyi, *Lév.* On living leaves of *Lonicera Caprifolium.*

M. Berberidis, *Lév.* On living leaves of *Berberis vulgaris.*

M. penicillata, *Lév.* On living leaves of *Lonicera sempervirens* and *Betula alba.*

Erysiphe, *Hedwig.*

E. cïchoracearum, *DC.* On *Aster grandiflorus, Centaurea nigrescens, Cousinia uncinata.* Also very abundant in conidial condition on living leaves of various cucurbitaceous plants. When abundantly developed the leaves present the appearance of having received a coat of whitewash.

E. polygoni, *DC.* On leaves of *Ranunculus, Delphinium,* and *Polygonum aviculare.*

E. graminis, *DC.* On living leaves of *Hordeum vulgare.*

PERISPORIEAE.

Pleuroascus, *Mass. & Salm.*

P. Nicholsoni, *Mass. & Salm.* On dung of Guinea-pig. A very curious fungus. The perithecia are densely gregarious, and imbedded at first in a snow-white weft of mycelium. This mycelium disappears when the perithecia arrive at maturity, and the latter remain firmly linked together into a mass by the interweaving of their own special appendages, which consist of flattened threads of mycelium coiled like a corkscrew.

Eurotium, *Link.*

E. Herbariorum, *Link.* On decaying plants. Common.

E. lateritium, *Mont.* On damp, decaying plants.

E. insigne, *Winter.* On dung of horse and dog. A very beautiful fungus having exceptionally large, globose, coloured, and densely spinulose spores. The mould formerly known as *Gliocladium penicillioides*, Corda, has been proved to be the conidial condition of this fungus. Ascospores of the *Eurotium* were sown on sterilized films of cork floating on a decoction of dung. These germinated freely and at the end of five days produced typical conidiophores of the *Gliocladium.* After 11 days the same mycelium bore perithecia of the *Eurotium.*

E. microsporum, *Mass. & Salm.* On dung of guinea-pig. An exceedingly minute species. The globose perithecia are of a delicate sage green colour.

Anixiopsis, *Hansen.*

A. stercoracia, *Hansen.* On owl-castings. Cultivated on rabbit-dung, beer-wort, cooked rice, &c.

Magnusia, *Sacc.*

M. nitida, *Sacc.* On rabbit-dung.

M. Bartlettii, *Mass. & Salm.* On dung of guinea-pig.

Arachnomyces, *Mass. & Salm.*

A. nitidus, *Mass. & Salm.* On leaves and stems of decaying plants. The perithecia are perfectly globose, black, and shining, and are furnished with long slender blackish appendages that are wavy and more or less spirally coiled at the tip.

A. sulphureus, *Mass. & Salm.* On dead grass forming the nest of some wild bee. Differs from the previous species in the yellow colour of the perithecium.

Perisporium, *Fries.*

P. vulgare, *Corda.* On rotting sacking.

Anixia, *Fries.*

A. spadicea, *Fckl.* On horse-dung.

A. perichaenoides, *Sacc.* On decaying plant stem.

CAPNODIEAE.

Capnodium, *Mont.*

C. Salicinum, *Mont.* On living branches and leaves of *Salix viminalis* and *S. Caprea.*

C. Tiliae, *Saccardo.* On living leaves of *Tilia cordata.*

Antennaria, *Link.*

A. laevigata, *Corda.* On bark of *Betula alba.*

HYPOCREAE.

Claviceps, *Tul.*

C. purpurea, *Tul.* Parasitic in the ovary of *Lolium perenne* and other grasses. The black, hornlike stroma of the fungus is known by the name of Ergot, and is used medicinally.

Cordyceps, *Fries.*

C. militaris, *Link.* On the larva of some insect. A.

C. ophioglossoides, *Link.* Parasitic on the subterranean fungus *Elaphomyces granulatus.* Q.

Epichloe, *Fries.*

E. typhina, *Pers.* Parasitic on the living stems of *Holcus anatus* and *H. mollis.*

Hypocrea, *Fries.*

H. rufa, *Pers.* On dead wood.

H. alutacea, *Fries.* On dead leaf heap.

Sphaeroderma, *Fckl.*

S. fimbriatum, *Rost.* On dung of guinea-pig.

S. Hulseboschii, *Oudem.* On rabbit-dung.

Polystigma, *Pers.*

P. rubrum, *Pers.* On living leaves of various species of *Prunus.*

Nectria, *Fries.*

N. cinnabarina, *Tode.* On dead branches. A true and very destructive parasite, attacking trees and shrubs, the branches of which become thickly studded with coral-coloured tubercles one to two lines in diameter.

N. inaurata, *Berk. & Broome.* On dead wood. A.

N. Ralfsii, *Berk. & Broome.* On dead bark.

N. aurea, *Berk. & Broome.* On the hymenium of an old dead specimen of *Polystictus versicolor,* Fr.

N. Aquifolii, *Fries.* On dead holly bark. A., B.

N. Lamyi, *Desm.* On dead wood.

N. ornata, *Mass. & Salm.* On horse-dung.

N. mammoidea, *Plow.* On dead hawthorn.

N. Ribis, *Tode.* On dead branches of *Ribes aureum.* Parasitic on various species of *Ribes.*

Calonectria, *Sacc.*

C. **Bloxami**, *Sacc.* On dead wood.

Hypomyces, *Fries.*

H. **chrysospermus**, *Tul.* On various species of *Boletus* and *Agaricus.*

H. **rosellus**, *Alb. & Schw.* On *Corticium*, *Stereum*, and *Poria.*

H. **lateritius**, *Fries.* On *Poria vaporaria.*

Lasionectria, *Saccardo.*

L. **rousselliana**, *Mont.* On dead wood.

Gibberella, *Saccardo.*

G. **cyanogena**, *Desm.* On bark of *Sambucus nigra.*

Acrospermum, *Tode.*

A. **compresssum**, *Tode.* On dead herbaceous stems.

XYLARIEAE.

Xylaria, *Hill.*

X. **polymorpha**, *Grev.* On decaying logs.

X. **digitata**, *Fries.* On dead wood.

X. **vaporaria**, *Berk.* In soil in frames.

X. **carpophila**, *Fries.* On fallen beech mast.

X. **Hypoxylon**, *Fries.* On dead wood.

Nummularia, *Tul.*

N. **Bulliardi**, *Tul.* On dead wood.

N. **lutea**, *Nits.* On dead boxwood.

Hypoxylon, *Fries.*

H. **coccineum**, *Bull.* On dead hazel.

H. **fuscum**, *Pers.* On dead wood.

H. **udum**, *Fries.* On rotten branches.

DOTHIDEAE.

Phyllachora, *Fuckel.*

P. **Ulmi**, *Duv.* On living leaves of *Ulmus.*

P. **Trifolii**, *Pers.* On living leaves of *Trifolium medium.*

P. **Graminis**, *Pers.* On living leaves of various grasses.

Rhopographus, *Nitzke.*

R. **filicinus** *Fries.* On living fronds of *Pteris aquilina.*

Rhytisma, *Fries.*

R. acerinum, *Pers.* On living leaves of *Acer campestre* and *A. Pseudoplatanus.* The large black blotches so common on sycamore leaves are caused by this fungus, which does considerable injury, causing the leaves to fall early in the season, consequently the wood is not properly matured, and the stock of accumulated food insufficient for the following year's growth. The fungus remains on the fallen leaves during the winter, and matures its fruit in the spring when the young sycamore leaves are inoculated. The disease can be arrested if the diseased leaves are collected and burned soon after they fall.

R. punctatum, *Fries.* On living leaves of *Acer Pseudoplatanus.*

R. salicinum, *Fries.* On living leaves of *Salix Caprea* and *S. viminalis.*

STIGMATEAE.

Stigmatea, *Fries.*

S. robertiana, *Fries.* On living leaves of *Geranium robertianum.*

S. Ægopodii, *Fries.* On living leaves of *Aegopodium.*

DIATRYPEAE.

Diatrype, *Fries.*

D. Brassicae, *Cke.* On dead cabbage stalks.

D. verruciformis, *Ehr.* On dead branches of *Fagus sylvatica.*

D. quercina, *Fries.* On dead branches of *Quercus.*

D. Stigma, *Hoffm.* On dead wood.

VALSEAE.

Valsa, *Fries.*

V. leucostoma, *Pers.* On branches of *Prunus.*

V. stellulata, *Fries.* On branches of *Ulmus campestris.*

V. Ailanthi, *Saccardo.* On bark of *Ailanthus glandulosa.*

V. ceratophora, *Tul.* On branches of *Ulmus montana.*

V. dissepta, *Fries.* On branches of *Ulmus campestris.*

V. Betulae, *Tul.* On bark of *Betula alba.*

V. Hippocastani, *Cke.* On branches of *Aesculus Hippocastanum.*

V. taleola, *Fries.* On bark of *Quercus.*

V. oncostoma, *Duby.* On twigs of *Robinia Pseudacacia*

V. robergeana, *Desm.* On dead fallen branches.

Valsa syngenesia, *Fries.* On branches of *Sambucus nigra.*

V. platanoides, *Pers.* On branches of *Acer Pseudoplatanus.*

V. nivea, *Fries.* On dead branches of *Crataegus.*

V. prunastri, *Fries.* On branches of *Cotoneaster bacillaris.*

Melanconis, *Tul.*

M. stilbostoma, *Fries.* On bark of *Betula alba.*

Pseudovalsa, *De Not.*

P. umbonata, *Tul.* On dead wood.

P. hapalocystis, *Berk. & Broome.* On dead twigs of *Platanus acerifolia.*

Fenestella, *Tul.*

F. Salicis, *Rehm.* On branches of *Salix.*

EUTYPAE.

Eutypa, *Tul.*

E. Acharii, *Tul.* On dead wood.

E. aspera, *Nitschke.* On wood.

E. spinosa, *Pers.* On blackthorn.

E. lata, *Pers.* On trunks.

E. flavo-virens, *Tul.* On hard wood.

Diaporthe, *Nitschke.*

D. pulla, *Nitschke.* On wood.

D. incarcerata, *Berk. & Broome.* On branches of *Rosa canina.*

D. resecans, *Nitschke.* On branches of *Syringa vulgaris.*

D. rostellata, *Fries.* On stems of *Rubus fruticosus.*

D. Phillyreae, *Cke.* On branches of *Phillyrea.*

D. circumscripta, *Otth.* On dry branches.

***D. Ryckholtii**, *West.* On trunk and branches of *Symphoricarpus racemosus.*

D. Epilobii, *Cke.* On stem of *Epilobium montanum.*

D. Lirella, *M. & N.* On stem of *Spiraea Ulmaria.*

Nitschkia, *Otth.*

N. cupularis, *Pers.* On dry branches of *Tilia vulgaris* and *Robinia Pseudacacia.*

CUCURBITARIEAE.

Cucurbitaria, *Gray.*

C. Berberidis, *Pers.* On branches of *Berberis vulgaris.*

C. Aspegrenii, *Ces.* On rotten wood.

C. Laburni, *Pers.* On branches of *Laburnum vulgare* and *L. alpinum.*

Diatrypella, *Sacc.*

D. Rhois, *Ellis.* On branches of *Rhus glabra.*

BYSSOSPHAERIEAE.

Byssosphaeria, *Cke.*

B. innumera, *Berk. & Broome.* On dead wood.

B. Aquila, *Fries.* On dead wood.

Lasiosphaeria, *Saccardo.*

L. sulphurella, *Saccardo.* On fallen branches.

L. ovina, *Pers.* On dead wood.

Venturia, *Not.*

V. Alchemillae, *Grev.* Parasitic on living leaves of *Alchemilla vulgaris.*

Chaetomium, *Kunze.*

C. elatum, *Kunze.* On damp straw.

C. pannosum, *Ktz.* On old sacking.

C. arachnoides, *Mass. & Salm.* On damp paper.

C. simile, *Mass. & Salm.* On dogs' dung.

C. bostrychoides, *Zopf.* On mouse dung.

Rosellinia, *Fries.*

R. pulveracea, *Fckl.* On dead twigs. Q.

Chaetosphaeria, *Fries.*

C. innumera, *Tul.* On dead wood. Q.

Psilosphaeria, *Saccardo.*

P. pulviscula, *Currey.* On dead wood.

P. spermoides, *Fries.* On dead wood.

P. pustula, *Currey.* On dead wood.

Trichosphaeria, *Sacc.*

T. pilosa, *Fckl.* On dead branches.

Melanomma, *Saccardo.*

M. Pulvis-pyrius, *Saccardo.* On rotten wood, stumps, &c. The perithecia are very minute, and densely crowded, often covering a surface of many square inches, and resembling grains of gunpowder, hence the specific name.

SORDARIEAE.

Sordaria, *Sacc.*

S. fimicola, *Roberge.* On horse dung.

S. anserina, *Winter.* On goose dung.

S. minima, *Sacc.* On rabbit dung.

S. hirta, *Winter.* On horse dung.

S. setosa, *Winter.* On rabbit dung.

S. curvicolla, *Winter.* On dung of rabbit and mouse.

S. neglecta, *Hansen.* On horse dung.

S. Winteri, *Karst.* On horse dung.

S. platyspora, *Plowr.* On horse dung.

S. minuta, *Fckl.* On rabbit dung.

S. decipiens, *Winter.* On rabbit dung. This species is interesting on account of the variation in number of spores occurring in an ascus. Asci from the same specimen have occurred containing four and eight spores each, respectively.

CRYPTOSPHAERIEAE.

Cryptosphaeria, *Grev.*

C. millepunctata, *Grev.* On dead branches.

Physalospora, *Saccardo.*

P. rosicola, *Fckl.* On branches of cultivated roses.

Endophlaea, *Fries.*

E. salicella, *Fries.* On branches of *Salix vitellina*, *S. alba*, and *S. Caprea.*

E. sphingiophora, *Oudem.* On branches of *Cornus alba.*

Leptosphaeria, *Saccardo.*

L. vagabunda, *Saccardo.* On branches of *Hypericum calycinum* and *Kerria japonica.*

Metasphaeria, *Saccardo.*

M. complanata, *Tode.* On dead herbaceous stems.

Raphidospora, *Saccardo.*

R. rubella, *Pers.* On various kinds of dead herbaceous stems. The presence of the minute parasite is indicated by a red stain on the matrix.

R. acuminata, *Sow.* On dead herbaceous stems.

Heptameria, *Saccardo.*

H. arundinacea, *Sow.* On culms of *Arundo Donax.*

H. Doliolum, *Pers.* On dead herbaceous stems.

H. acuta, *Mont.* On dead herbaceous stems of various plants.

H. Typharum, *Desm.* On leaves of *Typha angustifolia.*

H. Rusci, *Wallr.* On branches and phyllodes of *Ruscus.*

Pleospora, *Saccardo.*

P. Bardanae, *Nsl.* On dead stems of *Arctium.*

P. Meliloti, *Rab.* On dead stems of *Melilotus officinalis.*

P. denotata, *Cke. & Ellis.* On dead herbaceous stems.

P. Asparagi, *Sacc.* On dead stems of *Asparagus officinalis.*

P. Herbarum, *Pers.* On decaying stems of most herbaceous Dicotyledons.

Laestadia, *Saccardo.*

L. veneta, *Sacc. & Speg.* On fallen leaves of *Platanus acerifolia.*

L. Rhodorae, *Cke.* On dead herbaceous stems.

L. Iridis, *Cke.* On dead leaves of *Iris Pseudacorus.*

L. echinophila, *Sacc.* On involucres of sweet chestnut.

Sphaerella, *Pers.*

S. hedericola, *Desm.* On dead ivy leaves.

S. maculaeformis, *Pers.* On fallen leaves of *Castanea sativa.*

S. Brassicicola, *Ces.* On dead leaves and fruit of *Brassica oleracea.*

S. isariophora, *Desm.* On leaves of *Stellaria nemorum* and *S. media.*

DISCOMYCETES.

HELVELLEAE.

Morchella, *Dill.*

M. crassipes, *Pers.* Among grass under trees. A very fine species, sometimes reaching a height of 10 to 14 inches. Edible. First detected at Kew by Lady Thiselton-Dyer. A., P.

M. esculenta, *Pers.* Among grass in spring. Edible. A.

M. conica, *Pers.* Among grass in spring. Edible. A.

M. smithiana, *Cke.* Among grass. A very large showy fungus appearing in the spring. Edible. A.

Mitrophora, *Lév.*

M. Gigas, *Lév.* Among grass in the spring. A., Q.

M. semilibera, *Lév.* On naked soil under a hedge. In the spring. A.

Helvella, *Fries.*

H. crispa, *Fries.* Among grass under trees in spring. Edible. A., Q.

H. lacunosa, *Afz.* Among grass appearing in spring. A.

H. elastica, *Bull.* Among grass in spring. A., Q.

Mitrula, *Fries.*

M. phalloides, *Chev.* On masses of floating dead leaves in the lake.

M. cucullata, *Fries.* On decaying pine leaves. A.

M. olivacea, *Saccardo.* Among short grass. A.

Leotia, *Hill.*

L. lubrica, *Pers.* Under trees. Q.

L. acicularis, *Pers.* On decaying stumps. A.

Vibrissea, *Fries.*

V. Guernisaci, *Crouan.* On decayed willow twigs floating in the lake.

Geoglossum, *Pers.*

G. glutinosum, *Pers.* Among grass. A.

G. glabrum, *Pers.* Among grass. A.

G. hirsutum, *Pers.* Among grass. A., P.

PEZIZEAE.

Acetabula, *Fckl.*

A. vulgaris, *Fckl.* On the ground. A very beautiful fungus of a brownish colour, resembling a carved font in miniature. A.

Otidea, *Pers.*

O. onotica, *Fckl.* On the ground under trees. A.

O. leuculenta, *Massee.* On soil of plant-pot.

O. aurantia, *Mass.* On the ground. A large, showy fungus, cup-shaped and usually much waved and crisped, of a clear, deep orange colour. A., Q.

O. luteo-nitens, *Massee.* On the ground.

Peziza, *Dill.*

P. saniosa, *Schrad.* On the ground. A quantity of violet liquid escapes when the plant is wounded. A.

P. vesiculosa, *Bull.* On manure heaps, rich soil, &c. Common.

P. ampliata, *Pers.* On dead bark. Q.

P. ochracea, *Boud.* On the ground under beeches. A.

P. badia, *Pers.* On the ground. A.

P. bufonia, *Pers.* On a rubbish heap. Q.

Geopyxis, *Pers.*

G. carbonaria, *Saccardo.* On burnt ground. A.

G. coccinea, *Mass.* On fallen branches. This fungus appears to be somewhat rare in the south of England; in the north it is a very common species, and is collected and sold along with moss for decorative purposes. It appears during the winter and early spring. Q.

G. cupularis, *Saccardo.* Damp ground. Q.

Humaria, *Fries.*

H. Chateri, *W. G. Smith.* On naked ground by the sides of paths, &c. On one occasion this species was so abundant on a path in the arboretum that it showed as a red streak at a considerable distance away.

H. rutilans, *Saccardo.* On the ground. A., P.

H. pilifera, *Saccardo.* On soil in a plant-pot.

H. carbonigena, *Saccardo.* On burnt ground. A.

H. hepatica, *Sacc.* On the ground among grass.

Humaria omphalodes, *Mass.* On burnt ground. A.

H. melaloma, *Mass.* On burnt ground. P.

H. Nicholsonii, *Massee.* On heaps of dead leaves. A very fine large, bright yellow species, named after its discoverer, G. Nicholson, F.L.S.

H. violacea, *Sacc.* On soil. A very fine cluster of this fungus was growing on cinders that had only been taken out of the furnace in the winter garden two days before.

H. macrocystis, *Saccardo.* On burnt ground. P.

H. granulata, *Saccardo.* On dung. Common.

Barlaea, *Saccardo.*

B. Constellatio, *Saccardo.* On the ground. A.

B. Crouani, *Mass.* On the ground among moss. A.

Curreyella, *Mass.*

C. trachycarpa, *Mass.* On burnt ground. A.

Sepultaria, *Cke.*

S. sumneriana, *Mass.* On the ground under pines. A.

Neottiella, *Cke.*

N. Polytrichi, *Mass.* On the ground among moss. A.

N. corallina, *Mass.* On the ground among moss. A., Q.

Dasyscypha, *Fries.*

D. virginea, *Fckl.* On rotten twigs and herbaceous stems in damp places. Common.

D. nivea, *Mass.* On damp fallen twigs. A., P.

D. bicolor, *Fckl.* On dead oak twigs. A.

D. subtilissima, *Cooke.* On larch twigs. Q.

D. aspidiicola, *Saccardo.* On dead fronds of *Nephrodium Filix-mas.* A., Q.

D. hyalina, *Mass.* Inside fallen bark, on chips, &c. Common.

D. leucophaea, *Mass.* On stems of dead herbaceous plants. B.

D. melaxantha, *Mass.* On fallen branches of beech. Q.

D. calycina, *Fckl.* On living larch twigs. A very destructive parasite to the larch when grown in damp localities in lowland districts.

D. corticalis, *Mass.* On dead bark. Q.

D. fuscescens, *Rehm.* On dead straw. A.

Dasyscypha acuum, *Sacc.* On scales of pine cones.

D. puberula, *Massee.* On dry oak leaves.

D. vitriola, *Massee.* On dry raspberry stems.

D. clandestina, *Fckl.* On dead wood. A.

D. dematiicola, *Mass.* On dead rose stems. A.

Lachnea, *Fries.*

L. stercorea, *Gillet.* On dung. Common.

L. crucipila, *Phil.* On damp ground. P.

L. scutellata, *Gillet.* On stumps, also on naked ground. A., Q.

L. hemispherica, *Gillet.* On the ground under trees. A.

L. erinacea, *Saccardo.* On rotten wood. A.

Erinella, *Quel.*

E. apala, *Berk.* On grass culms.

Tapesia, *Pers.*

T. fusca, *Fckl.* On dead bark. Q.

T. aurata, *Mass.* On dead wood. A.

T. sanguinea, *Fckl.* On pine wood. A.

Chlorosplenium, *Fries.*

C. aeruginosum, *De Not.* On branches of ash and oak. The wood on which this fungus grows is stained a deep verdigris-green colour, and was at one time used for the manufacture of fancy articles known as "Tunbridge ware." A., Q.

C. discoideum, *Mass.* On an old trunk of *Robinia Pseudacacia.* The wood on which the fungus grows is stained green. A.

Sclerotinia, *Fckl.*

S. tuberosa, *Fckl.* Parasitic on the rhizome of *Anemone nemorosa.* A destructive parasite when it finds its way into a bed of anemones. B.

S. candolleana, *Fckl.* On dead leaves of sweet chestnut.

S. Galanthi, *Rehm.* *See Kew Bull.*, 1897, p. 172. B.

S. Sclerotiorum, *Mass.* On cabbage stalks. P.

Ciboria, *Fckl.*

C. pseudo-tuberosa, *Saccardo.* On fallen, decaying acorns. A.

C. echinophila, *Sacc.* Inside fallen husks of horse-chestnut. Q.

Cyathicula, *De Not.*

C. coronata, *De Not.* On various kinds of dead or decaying herbaceous stems. Q.

Helotium, *Fries.*

H. claro-flavum, *Berk.* On damp, decaying branches. Q.

H. Laburni, *Berk. & Broome.* On branches of *Laburnum vulgare.* A.

H. lenticulare, *Fries.* On beech trunks. A.

H. citrinum, *Fries.* On stumps. A., B.

H. Virgultorum, *Karsten.* On dead branches. Common.

H. cyathoideum, *Karsten.* On dead herbaceous stems. B.

H. Herbarum, *Fries.* On dead and damp herbaceous stems. Common.

H. renisporum, *Ellis.* On petioles and veins of fallen oak leaves. A.

H. scutula, *Karst.* On dead bramble stem.

H. punctiforme, *Phil.* On dead oak leaves.

H. ochraceum, *Grev.* On dead leaves.

H. serotinum, *Karst.* On dead raspberry stems.

H. trabinellum, *Karst.* On a rotten plank.

H. phyllophilum, *Fries.* On dead beech leaves.

H. immutabile, *Fckl.* On dead branches.

H. lacteum, *Massee.* On rabbit dung.

H. conigenum, *Fries.* On scales of fallen cones. A.

Belonidium, *Mont. & Dur.*

B. pruinosum, *Mass.* On dead wood and bark ; also on *Diatrype Stigma.* Q.

Mollisia, *Fries.*

M. atrata, *Karsten.* On dead stems of various herbaceous plants. Common.

M. fusca, *Mass.* On dead wood. A.

M. cinerea, *Karsten.* On dead wood. Common.

M. melaleuca, *Saccardo.* On chips. A.

M. pineti, *Phil.* On rotten cone scales.

M. stictella, *Sacc.* On worked wood.

Mollisia atro-cinerea, *Phil.* On chips. Q.

M. viridi-flavescens, *Rehm.* On dead twigs. Q.

Pseudopeziza, *Fckl.*

P. petiolaris, *Mass.* On dead petioles of *Acer Pseudoplatanus.* P.

P. Ranunculi, *Saccardo.* On dying leaves of *Ranunculus acris.* A.

ASCOBOLEAE.

Thelebolus, *Tode.*

T. stercoreus, *Tode.* On rabbit dung, very abundant. An account of the development and position in a systematic arrangement of this peculiar species is given in *Ann. Bot.* xv. 313, in a paper entitled "Researches on Coprophilous Fungi," by G. Massee and E. S. Salmon. Notes on numerous species, either collected in the grounds at Kew, or grown in the laboratory, on dung received from various parts of the world, are also given.

Ascobolus, *Pers.*

A. asininus, *Mass.* On asses' dung. P.

A. marginatus, *Mass.* On asses' dung. P.

A. furfuraceus, *Pers.* On horse dung. A., P.

A. immersus, *Pers.* On goose dung. A.

A. vinosus, *Berk.* On goose dung. A rare species in the South of England, although very common in the North on rabbit dung.

A. perplexans, *Mass. & Salm.* On horse dung.

Saccobolus, *Boud.*

S. violascens, *Boud.* On rabbit dung. Q.

S. quadrisporus, *Mass. & Salm.* On goose dung.

S. Kerverni, *Boud.* On rabbit dung.

S. neglectus, *Boud.* On rabbit dung.

Ascophanus, *Boud.*

A. microsporus, *Phil.* On rabbit dung. Q.

A. carneus, *Boud.* On an old shoe. A.

A. equinus, *Mass.* On horse dung. A., Q.

A. ochraceus, *Boud.* On goose dung.

Ryparobius, *Boud.*

R. sexdecimsporus, *Saccardo.* On horse dung. A.

R. argenteus, *Berk. & Broome.* On rabbit dung. Q.

R. ascophanoides, *Sacc.* On rabbit dung.

BULGARIEAE.

Bulgaria, *Fries.*

B. polymorpha, *Wetts.* On beech trunks. Said to be a true parasite. A.

Ombrophila, *Fries.*

O. brunnea, *Phil.* On dead herbaceous stem.

O. rudis, *Phil.* On an old stump.

Orbilia, *Fries.*

O. inflatula, *Karsten.* On rotten, damp wood. A.

O. luteo-rubella, *Karst.* On dead branch.

Calloria, *Fries.*

C. fusarioides, *Fries.* On dead nettle stems. Common.

Coryne, *Tulasne.*

C. urnalis, *Saccardo.* On decayed stump. A., B.

C. sarcoides, *Tul.* On rotten wood. Conidial and ascigerous stages common.

DERMATEAE.

Cenangium, *Fries.*

C. furfuraceum, *De Not.* On alder branches. Q.

Scleroderris, *Fries.*

S. Rubi, *Mass.* On dead bramble stems. Q.

Cenangella, *Sacc.*

C. radulicola, *Rehm.* On alder roots.

PATELLARIEAE.

Patinella, *Saccardo.*

P. macrospora, *Mass.* On rotten wood. A.

Patellaria, *Wahl.*

P. clavispora, *Berk. & Broome.* On ash branches. A.

P. atrata, *Fries.* On rotten floorcloth. A.

Heterosphaeria, *Grev.*

H. Patella, *Grev.* On dead herbaceous stems. Q.

STICTEAE.

Stictis, *Pers.*

S. radiata, *Pers.* On hard, decorticated wood. Common.

Propolis, *Fries.*

P. rhodoleuca, *Fries.* On scales of cones of *Pinus sylvestris.* A.

PHACIDIEAE.

Coccophacidium, *Rehm.*

C. Pini, *Rehm.* On bark of *Pinus sylvestris.* A.

Schizothyrium, *Desm.*

S. aquilinum, *Rehm.* On dead fronds of *Pteris aquilina.*

Phacidium, *Fries.*

P. multivalve, *Kze. & Schm.* On dead holly leaves. A.

P. terreste, *Phil.* On rotten leaves on the ground. A.

Trochila, *Fries.*

T. Craterium, *Fries.* On dead ivy leaves. D.

Colpoma, *Wallr.*

C. quercinum, *Wallr.* On oak branches. A.

Xylographa, *Fries.*

X. parallela, *Fries.* On old wood. Q.

HYSTERIACEAE.

Hysterium, *Tode.*

H. pulicare, *Pers.* On fallen oak bark. A.

Hysterographium, *Corda.*

H. Fraxini, *De Not.* On fallen ash branches. A.

Glonium, *Mühl.*

G. amplum, *Duby.* On dead bramble stems. Q.

Hypoderma, *DC.*

H. Virgultorum, *DC.* On dead bramble stems. Q.

H. conigenum, *Cke.* On fallen cones of *Pinus sylvestris.* A.

Lophodermium, *Chev.*

L. hysterioides, *Saccardo.* On dead hawthorn leaves. A.

L. pinastri, *Chev.* On pine leaves.

Dichaena, *Fries.*

D. quercina, *Fries.* On living oak branches. A.

PHYCOMYCETES

PILOBOLEAE.

Pilobolus, *Tode.*

P. crystallinus, *Tode.* On dung.

P. Kleinii, *Van Tiegh.* On dung.

P. exiguus, *Bain.* On goose dung.

P. roridus, *Pers.* On dung.

P. Oedipus, *Mont.* On dung.

MUCORINI.

Pilaira, *Van Tieghem.*

P. anomala, *Schröt.* On dung.

Mucor, *Micheli.*

M. Mucedo, *L.* On various decaying organic substances.

M. lateritius, *Cke. & Mass.* On rotting potatoes.

M. amethystinus, *Berk.* On decaying bulbs.

M. pruinosus, *Berk. & Broome.* On soil in a plant pot.

M. hyalinus, *Cke.* On leaves of *Buxus sempervirens.*

M. racemosus, *Fries.* On pigeons' dung.

Phycomyces, *Kunze.*

P. nitens, *Kunze.* On fat, also on decaying seeds of *Magnolia.*

Spinellus, *Van Tiegh.*

S. fusiger, *Van Tiegh.* On decaying Agarics.

Sporodinia, *Link.*

S. Aspergillus, *Schrot.* On decaying fungi.

Helicostylum, *Corda.*

H. nigricans, *Van Tiegh.* Once occurred abundantly on dead woodlice (*Oniscus*) collected in a heap under bark.

Thamnidium, *Link.*

T. elegans, *Link.* On decaying vegetable matter.

Rhizopus, *Ehr.*

R. nigricans, *Ehr.* On decaying fruit.

Rhizopus necans, *Mass.* Parasitic on bulbs of *Lilium auratum*, received from Japan. In 1896 and 1897 large consignments of bulbs from Japan were completely destroyed by this fungus. For an account of its life-history *see* the *Kew Bulletin*, 1897, p. 87.

Piptocephalis, *Van Tiegh.*

P. freseniana, *De Boug.* On dung.

Circinella, *Van Tiegh.*

C. umbellata, *Van Tiegh.* On cats' dung.

Helicostylum, *Van Tiegh.*

H. piriforme, *Bain.* On mouse dung.

SYNCEPHALIDEAE.

Syncephalis, *Van Tiegh.*

S. fasciculata, *Van Tiegh.* On wet and decaying vegetable matter.

PERONOSPOREAE.

Cystopus, *Lév.*

C. candidus, *Lév.* On *Capsella Bursa-pastoris*, *Cheiranthus Cheiri*, *Erysimum perofskianum*, and *Pringlea antiscorbutica.* It has been found impossible to keep the last named plant in cultivation, owing to the attacks of this parasite.

C. Tragopogonis, *Schröt.* Parastic on *Tragopogon pratensis* and *Ipomoea.*

Phytophthora, *De Bary.*

P. infestans, *De Bary.* Parastic on leaves and tubers of the potato (*Solanum tuberosum*). This fungus is the cause of the destructive scourge popularly called "potato disease" although unfortunately it is not the only fungous disease to which the potato is subject.

Plasmopara, *Schröt.*

P. pygmaea, *Schröt.* Parasitic on leaves of various Ranunculaceous plants, *Anemone*, *Aconitum*, *Isopyrum.*

P. nivea, *Schröt.* Parastic on leaves of species of *Aegopodium* and *Conium.*

Bremia, *Regel.*

B. Lactucae, *Regel.* Parasitic on leaves of *Centaurea* and *Hieracium.* This fungus is often very destructive to garden lettuce, appearing on the leaves as a very delicate white film.

Peronospora, *Corda.*

P. Myosotidis, *De Bary.* On living leaves of *Myosotis palustris* and *Symphytum tuberosum.*

P. Viciae, *De Bary.* On living leaves of various Leguminous plants.

P. Ficariae, *Tul.* On living leaves of *Ranunculus Ficaria.*

P. arborescens, *De Bary.* On living leaves of *Papaver Argemone, P. somniferum*, also on various garden forms of poppy.

P. Violae, *De Bary.* On living leaves of *Viola canina* and *V. sylvestris.*

P. Trifoliorum, *De Bary.* On living leaves of *Trifolium minor, T. medium*, and on *Lotus corniculatus.*

P. grisea, *De Bary.* On living leaves of *Veronica Chamaedrys.*

P. Lamii, *De Bary.* On living leaves of *Lamium rubrum.*

P. effusa, *Rabenh.* On *Chenopodium album.*

P. sordida, *Berk.* On living leaves of *Verbascum Thapsus.*

P. sparsa, *Berk.* On living leaves of cultivated roses.

SAPROLEGNIEAE.

Leptomitus, *Agardh.*

L. lacteus, *Agardh.* Attached to aquatic plants.

Saprolegnia, *Nees.*

S. ferox, *Nees.* On dead flies in water.

S. elongata, *Mass.* On decaying trunk of tree-fern in water. (*Mass. Brit. Fungi*, 217, figs. 47–49.)

Pythium, *Pringsheim.*

P. de-baryanum, *Hesse.* Parasitic and saprophytic on various plants. A destructive parasite to seedling plants, causing what is termed " damping off."

P. Cystosiphon, *Lindst.* In living fronds of *Wolffia Michelii.*

Dityuchus, *Leitg.*

D. monosporus, *Leitg.* On decaying hyacinth bulbs.

Diplanes, *Leitg.*

D. saprolegnioides, *Leitg.* On insects in water.

Achlya, *Nees.*

A. polyandra, *Hildebr.* On insects in water.

ENTOMOPHTHOREAE.

Empusa, *Cohn.*

E. Muscae, *Cohn.* On dead house flies.

Entomophthora, *Fresenius.*

E. Aphidis, *Hoffm.* On aphides.

CHYTRIDEAE.

Synchytrium, *De Bary & Woronin.*

S. Mercurialis, *Fckl.* On living leaves of *Mercurialis perennis.*

S. Anemones, *Woronin.* On living leaves of *Anemone nemorosa.*

Rhizidium, *A. Braun.*

R. Westii, *Mass.* Parasitic on *Spirogyra nitida.*

Olpidium, *Schröt.*

O. Lemnae, *Schröt.* On the epidermal cells of *Lemna minor.*

PROTOMYCETEAE.

Protomyces, *Unger.*

P. Menianthis, *De Bary.* On living leaves of *Potentilla Comarum.*

P. purpureo-tingens, *Mass.* On leaves of seedling sunflowers. (*Mass. Brit. Fungi*, 164, figs. 72, 73.)

HYPODERMII.

UREDINEAE.

Uromyces, *Link.*

U. Fabae, *Cke.* On *Vicia Faba.*

U. Orobi, *Wint.* On *Lathyrus macrorrhizus.*

U. Polygoni, *Wint.* On *Polygonum aviculare.*

U. Trifolii, *Wint.* On *Trifolium repens.*

U. Geranii, *Wint.* On *Geranium pratense.*

U. Valerianae, *Wint.* On *Valeriana officinalis.*

***U. Colchici,** *Mass.* On *Colchicum speciosum.* A destructive parasite that appeared once in the grounds, attacking every plant of the species named; and although *C. autumnale* grew on one side of the bed of diseased plants, and *C. byzantinum* on the other, neither of the last named was attacked. (*Grev.* xxi., 6, pl. 182, figs. 16–18.)

Uromyces Poae, *Rabh.* Aecidiospores on *Ranunculus Ficaria;* teleutospores on *Poa annua.*

U. Pisi, *Wint.* Teleutospores and uredospores on *Pisum sativum;* aecidiospores not seen, although species of *Euphorbia* are not wanting.

U. Alliorum, *Cke.* Teleutospores on *Allium.*

U. Ficariae, *Wint.* On *Ranunculus Ficaria.*

U. Scillarum, *Wint.* On *Scilla bifolia.*

U. Erythronii, *DC.* On *Lilium candidum.*

Puccinia, *Persoon.*

P. Galii, *Wint.* On *Galium verum.*

P. Calthae, *Link.* On *Caltha palustris.*

P. Gentianae, *Wint.* On *Gentiana acaulis.*

P. Silenes, *Schröt.* On *Silene inflata.*

P. Lapsanae, *Schulz.* On *Lapsana communis.*

P. variabilis, *Grev.* On *Taraxacum officinale.*

P. Violae, *Wint.* On *Viola canina.*

P. albescens, *Grev.* On *Adoxa Moschatellina.*

P. Menthae, *Pers.* On *Origanum vulgare.*

P. Vincae, *Berk.* On *Vinca major.*

P. Graminis, *Pers.* Teleutospores on *Alopecurus pratensis* and *Avena elatior*; notwithstanding the great quantity of *Berberis* and *Mahonia* present in the grounds, the most careful and continued search has failed to reveal the presence of the aecidiospore stage. This is probably the most destructive fungus known, doing injury to the extent of many millions of pounds sterling every year to the wheat crop in Europe alone.

P. coronata, *Corda.* Teleutospores on *Holcus mollis.* Aecidiospore stage not observed.

P. sylvatica, *Schröt.* Teleutospores on *Carex remota.* Aecidiospore not seen.

P. suaveolens, *Wint.* On *Cnicus arvensis.*

P. bullata, *Schröt.* On *Silaus pratensis.*

P. argentata, *Wint.* On *Impatiens fulva.*

P. Hydrocotyles, *Plow.* On *Hydrocotyle vulgaris.*

P. Campanulae, *Carm.* On *Campanula Rapunculus.*

P. Aegopodii, *Wint.* On *Aegopodium Podagraria.*

P. Thalictri, *Cheval.* On *Thalictrum flavum.*

Puccinia Veronicae, *Schröt.* On *Veronica montana.*

P. Malvacearum, *Mont.* On *Malva moschata* and *Althaea rosea.*

P. Circeae, *Pers.* On *Circaea lutetiana.*

P. Buxi, *DC.* On *Buxus sempervirens.*

Triphragmium, *Link.*

T. Ulmariae, *Wint.* On *Spiraea Ulmaria.*

Phragmidium, *Link.*

P. Tormentillae, *Fckl.* On *Potentilla Fragariastrum.*

P. violaceum, *Schultz.* On *Rubus fruticosus.*

P. Rubi, *Schröt.* On *Rubus fruticosus.*

P. subcorticatum, *Schröt.* On *Rosa canina*, also on cultivated roses.

Endophyllum, *Lév.*

E. Sempervivi, *Lév.* On *Sempervivum Tectorum.*

Gymnosporangium, *Castagne.*

G. Sabinae, *Wint.* Teleutospores on *Juniperus Sabina.*

Melampsora, *Castagne.*

M. Lini, *Wint.* On *Linum catharticum.*

M. farinosa, *Schröt.* On *Salix Caprea.*

M. populina, *Lév.* On *Populus balsamifera.*

M. betulina, *Desm.* On *Betula alba.*

Coleosporium, *Lév.*

C. Senecionis, *Wint.* Uredospores on *Senecio vulgaris.*

C. Sonchi, *Schröt.* On *Sonchus oleraceus.*

C. Campanulae, *Wint.* On *Campanula Trachelium.*

C. Euphrasiae, *Wint.* On *Euphrasia officinalis.*

Chrysomyxa, *Unger.*

C. Pyrolae, *Schröt.* On *Pyrola.*

Cronartium, *Fries.*

C. flaccidum, *Alb. & Schw.* On *Paeonia.*

USTILAGINEAE.

Ustilago, *Pers.*

U. longissima, *Wint.* On *Glyceria aquatica.*

U. hypodytes, *Fries.* On *Agropyron repens.*

U. Caricis, *Wint.* On *Carex panicea.*

U. olivacea, *Tul.* On *Carex riparia.*

U. Scabiosae, *Wint.* In the anthers of *Scabiosa arvensis.*

***U. Vaillantii,** *Tul.* In the anthers of *Chinodoxa Luciliae.*

U. bromivora, *Fisch. de Waldh.* In ovary of *Bromus mollis.* Q.

U. segetum, *Dittm.* In ovary of *Arrhenatherum elatius.* A.

Sphacelotheca, *De Bary.*

S. Hydropiperis, *De Bary.* In the ovary of *Polygonum Hydropiper.*

Urocystis, *Rab.*

U. Colchici, *Tul.* On *Colchicum autumnale.*

U. Gladioli, *W. G. Smith.* On *Gladiolus.*

U. Anemones, *Schröt.* On *Ranunculus repens.*

U. Violae, *Berk. & Broome.* On *Viola odorata* and *V. canina.*

Tilletia, *Tulasne.*

T. striiformis, *Magnus.* On living leaves of *Holcus mollis.* Q.

Entyloma, *De Bary.*

E. Ranunculi, *Wint.* On *Ranunculus Ficaria.*

Tuburcinia, *Fries.*

T. Scabies, *Berk.* On potato tubers. Causing the disease known as "scab."

Doassansia, *Cornu.*

D. Sagittariae, *Schröt.* On *Sagittaria sagittifolia.*

Thecaphora, *Fing.*

T. hyalina, *Fing.* On *Calystegia sepium.*

Graphiola, *Poitier.*

G. Phoenicis, *Moug.* On leaves of *Phoenix dactylifera.*

SPHÆROPSIDEAE.

SPHÆRIOIDEAE.

The majority of species included in the present family occur on leaves or herbaceous stems, some as parasites, others as saprophytes. All are very minute, and the great majority require the use of a pocket-lens for their detection.

Phoma, *Fries.*

P. Coluteae, *Saccardo.* On branches of *Colutea arborescens.*

P. Coronillae, *West.* On *Coronilla Emerus* and *Baccharis halimifolia.*

***P. Sophorae,** *Saccardo.* On *Sophora japonica.*

P. Amorphae, *Saccardo.* On *Amorpha fruticosa.*

P. Herminierae, *Cke.* On *Herminiera elaphroxylon.*

P. rudis, *Saccardo.* **On** *Laburnum.*

***P. Ryckholtii,** *Saccardo.* On *Symphoricarpus.*

P. Xylostei, *Cke. & Mass.* On *Lonicera.*

P. viventis, *Cke.* On living twigs of *Lonicera.*

P. Beckhausii, *Cke.* On *Viburnum Lantana.*

***P. Weigeliae,** *Speg.* On *Diervilla rosea.*

P. Sambucella, *Saccardo.* On *Sambucus nigra.*

P. Landegheimiae, *Saccardo.* On *Philadelphus.*

***P. Philadelphi,** *Cke.* On *Philadelphus.*

P. foveolaris, *Fries.* On *Euonymus.*

P. Celastriniae, *Cke.* On *Euonymus americanus.*

P. berberina, *Saccardo.* On *Berberis vulgaris.*

P. Prunorum, *Cke.* On *Prunus Laurocerasus.*

P. Pruni-lusitanicae, *Cke.* On *Prunus lusitanica.*

P. libertiana, *Sacc. & Roum.* On *Larix europaeus.*

***P. Sorbariae,** *Cke.* On *Spiraea japonica* and *Neillia opulifolia.*

***P. Opulifoliae,** *Cke.* On *Neillia opulifolia.*

P. Mali, *Schulzer & Sacc.* On apple twigs.

P. ambigua, *Saccardo.* On pear twigs.

P. Amelanchieris, *Cke.* On *Amelanchier.*

P. pusilla, *Schulzer & Sacc.* On *Rosa canina.*

P. incarcerata, *Saccardo.* On *Rosa canina.*

Phoma Viniferae, *Cke.* On *Vitis vinifera.*

P. diplodioides, *Saccardo.* On *Aesculus Hippocastanum.*

P. scobina, *Cke.* On *Fraxinus excelsior.*

***P. Forsythiae**, *Cke.* On *Forsythia.*

***P. aromatica**, *Cke.* On *Calycanthus occidentalis.*

P. domestica, *Saccardo.* On *Jasminum officinale.*

P. Jasmini, *Cke.* On *Jasminum officinale.*

P. depressa, *Lév.* On *Syringa vulgaris.*

P. Laurella, *Saccardo.* On *Laurus nobilis.*

P. Rhododendri, *Cke.* On *Rhododendron.*

P. Corni, *Fckl.* On *Cornus suecica.*

***P. Barbari**, *Cke.* On *Lycium chinense.*

P. viridarii, *Saccardo.* On *Magnolia.*

P. stictica, *Berk. & Broome.* On *Buxus sempervirens.*

P. cistina, *Cke.* On *Cistus laurifolius.*

P. robergeana, *Saccardo.* On *Staphylea pinnata.*

***P. Staphyleae**, *Cke.* On *Staphylea pinnata.*

P. Ophites, *Saccardo.* On *Hibiscus syriacus.*

***P. Exul**, *Saccardo.* On *Maclura aurantiaca.*

***P. Loti**, *Cke.* On *Diospyros Lotus.*

***P. Tecomae**, *Saccardo.* On *Tecoma radicans.*

P. Radicantis, *Cke.* On *Tecoma radicans.*

P. platanoides, *Cke.* On *Acer Pseudoplatanus.*

P. Lebiseyi, *Saccardo.* On *Negundo aceroides.*

P. velata, *Saccardo.* On *Tilia vulgaris*, &c.

P. Paulowniae, *Thum.* On *Paulownia imperialis.*

P. Tamaricella, *Saccardo.* On *Tamarix.*

P. Tamarisci, *Mont.* On *Tamarix anglica.*

P. Eleagnella, *Cke.* On *Elaeagnus.*

P. papalocystis, *Saccardo.* On *Platanus.*

P. moricola, *Saccardo.* On *Morus nigra.*

***P. crassipes**, *Cke.* On *Broussonetia papyrifera.*

***P. cinerascens**, *Saccardo.* On *Ficus Carica.*

P. juglandina, *Saccardo.* On *Juglans regia.*

Phoma Quercella, *Sacc. & Roum.* On *Quercus coccinea.*

P. salicina, *West.* On *Salix viminalis.*

P. ligustrina, *Saccardo.* On *Ligustrum.*

P. oppilata, *Fries.* On *Betula alba.*

***P. Celtidis**, *Cke.* On *Celtis occidentalis.*

P. leucostigma, *Lév.* On leaves of *Hedera* and *Buxus.*

P. pustulata, *Saccardo.* On branches of *Acer palmatum.*

P. collabens, *Cke.* On living leaves of *Prunus lusitanica.*

P. glandicola, *Lév.* On fallen acorns.

P. strobiligena, *Desm.* On cone scales of *Pinus excelsa.*

P. Rhodorae, *Cke.* On *Rhododendron* leaves.

P. dispersus, *Cke.* On leaves of *Platanus.*

P. Aucubae, *West.* On leaves of *Aucuba japonica.*

P. Mahoniae, *Thum.* On leaves of *Berberis Aquifolium.*

P. vulgaris, *Saccardo.* On leaves of *Clematis Vitalba.*

P. Lingam, *Tode.* On stem of *Brassica oleracea.*

P. Alcearum, *Cke.* On leaves of *Althaea rosea.*

P. Malvacearum, *West.* On *Malva moschata.*

P. Arctii, *Lasch.* On *Arctium Lappa.*

P. Dipsaci, *Cke.* On *Dipsacus sylvestris.*

P. Achilleae, *Saccardo.* On *Achillea Millefolium.*

P. Dahliae, *Berk.* On *Dahlia.*

P. rubella, *Cke.* On stems of various Umbelliferous plants.

P. Dulcamarae, *Saccardo.* On *Solanum Dulcamara.*

P. Tatulae, *Cke.* On *Datura Stramonium.*

P. Polemonii, *Cke.* On *Polemonium coeruleum.*

P. Labiatarum, *Cke.* On *Marrubium.*

P. Spiraea, *Desm.* On *Spiraea Ulmaria.*

P. Herbarum, *West.* On *Digitalis, Malva, Aristolochia Sipho,* and *Menispermum.*

P. Polygonorum, *Cke.* On *Polygonum cuspidatum.*

P. Onagracearum, *Cke.* On *Epilobium angustifolium* and *Oenothera biennis.*

P. oleracea, *Saccardo.* On *Erysimum Alliaria* and *Sisymbrium austriacum.*

Phoma sarmenticia, *Saccardo*. On *Menispermum canadense*.

P. Calystegiae, *Cke*. On *Calystegia sepium*.

P. durandiana, *Sacc. & Roum*. On *Rumex*.

P. Lysimachiae, *Cke*. On *Lysimachia vulgaris*.

P. glandicola, *Desm*. On fallen acorns.

P. Morphae, *Saccardo*. On stems and capsules of *Papaver somniferum*.

***P. Chamaeropsis**, *Cke*. On palm petioles.

P. acori, *Cke*. On *Acorus Calamus*.

P. Rusci, *Saccardo*. On stems and phyllodes of *Ruscus*.

P. nebulosa, *Fries*. On stems of *Gentiana thibetica*.

P. Typharum, *Fckl*. On *Typha angustifolia*.

P. pulla, *Saccardo*. On *Hedera Helix*.

P. notha, *Berk*. On *Platanus*.

P. planiuscula, *Saccardo*. On *Robinia Pseudacacia* and *Ulmus campestris*.

P. Solidaginis, *Cke*. On *Solidago*.

P. Samarorum, *Desm*. On fruit of *Fraxinus excelsior*.

Coniothyrium, *Corda*.

C. cassiaecolum, *Cke*. On stems of *Cassia marylandica*.

C. Aucubae, *Sacc*. On dead branches of *Aucuba japonica*.

***C. concentricum**, *Desm*. On living leaves of *Yucca*. An injurious parasite, forming large dead blotches on the leaves.

Rhabdospora, *Mont*.

R. Muggenbergii, *Saccardo*. On branches of *Vitis vinifera*.

Diplodia, *Desm*.

***D. atrata**, *Desm*. On *Negundo aceroides*.

D. Genistarum, *Cke*. On *Genista aetnensis*.

D. Amorphae, *Wallr*. On *Amorpha fruticosa*.

D. cistina, *Cke*. On *Cistus laurifolius*.

D. Roumegueri, *Saccardo*. On *Prunus Laurocerasus*.

D. Lonicerae, *Fckl*. On *Lonicera Caprifolium*.

D. sambucina, *Saccardo*. On *Sambucus nigra*.

D. Lantanae, *Fckl*. On *Viburnum Lantana*.

***D. Paulowniae**, *Cke*. On *Paulownia imperialis*.

Diplodia Ligustri, *West.* On *Ligustrum vulgare.*

D. laurina, *Saccardo.* On *Laurus nobilis.*

D. Elaeagni, *Pass.* On *Elaeagnus angustifolius.*

D. Celtidis, *Roum.* On *Celtis occidentalis.*

D. Mori, *West.* On *Morus alba.*

D. microsporella, *Saccardo.* On *Ligustrum ovalifolium.*

D. inconspicua, *Cke.* On leaves of *Buxus sempervirens.*

D. Magnoliae, *West.* On twigs and leaves of *Magnolia grandiflora.*

D. Sarmentorum, *Fries.* On *Menispermum canadense.*

D. Aesculi, *Lév.* On horse chestnut branches.

Diplodina, *Saccardo.*

D. Salicis, *West.* On *Salix babylonica.*

D. deformis, *Karsten.* On *Sambucus nigra.*

Hendersonia, *Berk.*

H. vagans, *Fckl.* On *Fraxinus.*

H. Lonicerae, *Fries.* On *Lonicera.*

H. Tiliae, *Lév.* On *Tilia parvifolia*

H. sarmentorum, *West.* On vine twigs.

H. ambiens, *Cke.* On *Acer dasycarpum.*

Camarasporium, *Schultz.*

C. Berberidis, *Cke.* On twigs of *Berberis vulgaris.*

C. Limoniae, *Cke.* On *Citrus trifoliata.*

C. cistinum, *Cke.* On *Cistus laurifolius.*

C. Quercus, *Saccardo.* On *Quercus coccinea.*

C. Mori, *Saccardo.* On *Morus alba.*

Cytispora, *Fries.*

C. microspora, *Corda.* On *Amelanchier.*

C. atra, *Bon.* On *Morus alba.*

C. carbonacea, *Fries.* On *Celtis occidentalis.*

C. Schweinitzii, *Saccardo.* On *Salix fragilis.*

C. Salicis, *Rabh.* On *Salix vitellina.*

C. intermedia, *Saccardo.* On *Quercus.*

C. Platani, *Fckl.* On *Platanus.*

Cytispora flavovirens, *Saccardo.* On *Acer.*

C. ambiens, *Saccardo.* On *Fraxinus* and *Betula.*

C. Euonymi, *Cke.* On *Euonymus americanus.*

***C. annulata**, *Ellis & Everh.* On *Negundo* branches.

C. Staphyleae, *Cke.* On *Staphylea pinnata* and *S. trifoliata.*

C. Jasmini, *Cke.* On *Jasminum officinale.*

***C. Palmarum**, *Cke.* On petioles of palm leaves.

Phyllosticta, *Pers.*

P. Paviae, *Desm.* On *Aesculus parviflora.*

P. sanguinea, *Desm.* On *Cotoneaster frigida.*

P. Euonymi, *Saccardo.* On *Euonymus europaeus.*

P. tinea, *Saccardo.* On *Viburnum Tinus.*

P. Syringae, *West.* On *Syringa vulgaris.*

P. Phillyreae, *Saccardo.* On *Phillyrea.*

P. Rhododendri, *West.* On *Rhododendron.*

P. Arbuti, *Desm.* On *Arbutus Unedo.*

P. Garryae, *Cke. & Hark.* On *Garrya elliptica.*

P. ilicicola, *Fries.* On holly leaves.

P. Magnoliae, var. **Cookei**, *Saccardo.* On *Magnolia grandiflora.*

P. Mahoniae, *Sacc. & Speg.* On *Berberis Aquifolium.*

***P. asiatica**, *Cke.* On *Berberis asiatica.*

P. Paulowniae, *Saccardo.* On *Paulownia imperialis.*

P. sidaecola, *Cke.* On *Napaea dioica.*

P. Brassicae, *Currey.* On *Brassica.*

P. Epimedii, *Saccardo.* On *Epimedium alpinum.*

P. Impatientis, *Kirch.* On *Impatiens parviflora.*

P. destructiva, *Desm.* On *Malva sylvestris.*

P. Dulcamarae, *Saccardo.* On *Solanum Dulcamara.*

P. Plantaginis, *Saccardo.* On *Plantago major.*

P. Aizoon, *Cke.* On *Sedum Aizoon.*

***P. Podophylli**, *Curt.* On *Podophyllum peltatum.*

P. hydrophila, *Speg* On *Nymphaea alba.*

P. ruscicola, *Desm.* On *Ruscus aculeatus.*

Asteroma, *DC.*

A. Solidaginis, *Cke.* On *Solidago elliptica.*

A. delicatulum, *Desm.* On *Colutea arborescens.*

Septoria, *Fries.*

S. cornicola, *Desm.* On *Cornus.*

S. Ligustri, *Desm.* On *Ligustrum.*

S. Chelidonii, *Desm.* On *Chelidonium majus.*

S. Lycopi, *Pass.* On *Lycopus europaeus.*

S. Doronici, *Pass.* On *Doronicum Pardalianches.*

S. Centaureae, *Roum.* On *Centaurea nigra.*

S. Aristolochiae, *Saccardo.* On *Aristolochia Clematitis*

Leptostroma, *Fries.*

L. filicinum, *Fries.* On *Pteris aquilina.*

Discula, *Saccardo.*

D. Desmazierii, *Berk. & Broome.* On living branches of *Tilia vulgaris* and *T. platyphyllos.* The most destructive tree parasite present in the gardens, destroying the bark and hence killing the branches of the European species of *Tilia.* Several trees in the neighbourhood of Kew have been completely killed by this parasite.

Gloeosporium, *Mont.*

G. Aquilegiae, *Thum.* On *Aquilegia.*

G. Berberidis, *Cke.* On *Berberis asiatica.*

G. nervisequum, *Saccardo.* On living leaves of *Platanus orientalis* and *P. acerifolia.* A very destructive parasite, causing the leaves to fall prematurely.

Cryptosporium, *Kunze.*

C. Hippocastani, *Cke.* On *Aesculus Hippocastanum.*

Libertella, *Desm.*

L. Rosae, *Desm.* On bark of *Betula alba.*

L. taleola, *Sacc.* On twigs. Q.

L. pallida, *Fckl.* On branches of *Populus nigra.*

Melanconium, *Link.*

M. sphaeroideum, *Link.* On *Alnus incana.*

M. elevatum, *Corda.* On twigs. Q.

M. bicolor, *Nees.* On bark of *Betula* and *Quercus.*

Vermicularia, *Fries.*

V. uncinata, *Berk. & Curt.* On *Desmodium* twigs.

V. epixyla, *Fries.* On dead branches.

Cheirospora, *Fries.*

C. hedericola, *Saccardo.* On *Hedera Helix.*

Coryneum, *Nees.*

C. cistinum, *Cke.* On *Cistus laurifolius.*

C. umbonatum, *Nees.* On *Ulmus* and *Quercus.*

C. notarisianum, *Saccardo.* On *Betula papyrifera.*

Naemospora, *Pers.*

N. microspora, *Desm.* On bark of Portugal laurel.

Pestalozzia, *De Not.*

P. Guepini, *Desm.* Parasitic on living leaves of cultivated species of *Camellia*, causing unsightly greyish-white blotches to appear.

Steganosporium, *Corda.*

S. cellulosum, *Corda.* On bark of *Tilia cordata.*

HYPHOMYCETES.

MUCEDINEAE.

Chromosporium, *Corda.*

C. viride, *Corda.* On dead oak leaves.

Oospora, *Wallr.*

O. fasciculata, *Sacc. & Vogl.* On *Epilobum montanum.*

O. inaequalis, *Cke. & Mass.* On bamboo culms.

O. abortifaciens, *Sacc. & Vogl.* On twigs of *Crataegus.*

O. candidula, *Sacc.* On dead wood.

Fusidium, *Link.*

F. griseum, *Link.* On dead oak leaves.

Polyscytalum, *Riess.*

P. fecundissimum, *Riess.* On dead leaves.

Monilia, *Pers.*

M. fructigena, *Pers.* A very destructive parasite to apples, which under its influence become spotted and unsaleable.

M. pruinosa, *Cke. & Mass.* On fading leaves of *Caladium.*

Cylindrium, *Bon.*

C. Cordae, *Saccardo.* On dead oak leaves.

C. flavo-virens, *Bon.* On dead leaves of oak and beech.

C. elongatum, *Corda.* On dead beech leaves.

Oidium, *Link.*

O. farinosum, *Cke.* On leaves and young twigs of *Pyrus Malus.* An injurious fungus, causing the leaves to fall prematurely, consequently the fruit does not ripen properly.

O. erumpens, *Cke. & Mass.* On living leaves of *Rivea hypocrateriformis.*

O. monilioides, *Link.* On living leaves of *Holcus lanatus.*

O. leucoconium, *Desm.* On living leaves of cultivated roses.

O. Chrysanthemi, *Rab.* On living leaves of cultivated varieties of *Chrysanthemum.*

O. pactolinum, *Cke.* On living leaves of *Jasminum.*

CEPHALOSPORIEAE.

Botryosporium, *Corda.*

B. pulchrum, *Corda.* Overrunning stored *Dahlia* tubers.

Oedocephalum, *Preuss.*

O. Preusii, *Saccardo.* On dead leaves of *Heuchera.*

O. sulphureum, *Cke. & Mass.* On decaying rope.

O. glomerulatum, *Sacc.* On a heap of manure.

Rhopalomyces, *Corda.*

R. elegans, *Corda.* On decaying vegetable matter.

Trichoderma, *Pers.*

T. viride, *Pers.* On decaying wood, moss, &c. This is considered to be the conidial condition of *Hypocrea rufa.*

ASPERGILLEAE.

Aspergillus, *Micheli.*

A. glaucus, *Link.* On all kinds of damp or decaying plants.

A. candidus, *Link.* On decaying plants, fungi, &c.

Penicillium, *Link.*

P. glaucum, *Link.* On decaying plants.

P. candidum, *Link.* On decaying plants.

Hyphoderma, *Fries.*

H. roseum, *Fries.* On rotten wood.

Rhinotrichum, *Corda.*

R. repens, *Preuss.* On rotten wood.

R. niveum, *Cke. & Mass.* On old wood.

R. Bloxami, *Berk. & Broome.* On dead wood.

R. Thwaitesii, *Berk. & Broome.* On dead bramble stem.

Sporotrichum, *Link.*

S. laxum, *Nees.* On rotten wood.

Sterigmatocystis, *Van Tiegh.*

S. nigra, *Van Tiegh.* On decaying melons.

S. candida, *Sacc.* On tobacco that had become damp and mouldy.

S. sulphureum, *Grev.* On dead bark.

S. chlorinum, *Link.* On fallen oak leaves.

Monosporium, *Bon.*

M. coprophilum, *Cke. & Mass.* On dung.

Botrytis, *Micheli.*

B. corolligena, *Cke. & Mass.* On fading corolla of *Calceolaria.*

B. argillacea, *Cke.* On wood.

B. Croci, *Cke. & Mass.* On dead leaves of *Crocus.*

B. fascicularis, *Corda.* On dead pericarps of *Aesculus Hippocastanum.*

B. fulva, *Link.* On rotten leaves.

B. tricephala, *Sacc.* On dead leaves.

B. cinerea, *Pers.* On decaying vegetable matter.

B. vulgaris, *Fries.* On dead and also on living plants. The species of *Botrytis* are not very clearly understood; some are known to be the conidial forms of species of *Peziza.* At all events certain kinds of *Botrytis* are very destructive parasites, more especially to bulbous Monocotyledons, lilies, tulips, snowdrops, &c., being destroyed in a wholesale manner, and as sclerotia

are formed, many of which remain in the soil, it is impossible to grow these plants in succession, if the disease has once gained a footing.

Botrytis cana, *Kze. & Schm.* On decaying plants.

B. vera, *Fries.* On dead herbaceous plants.

Ovularia, *Saccardo.*

O. lychnicola, *Mass.* On living leaves of *Lychnis dioica.*

O. Berberidis, *Cke.* On living leaves of *Berberis asiatica.*

O. Filipendulae, *Cke.* On living leaves of *Spiraea Filipendula.*

O. Syringae, *Berk.* On living leaves of *Syringa vulgaris.*

Sepedonium, *Link.*

S. chrysospermum, *Fries.* On various decaying fungi. Said to be the conidial form of *Hypomyces chrysospermus*, Tul.

VERTICILLIEAE.

Verticillium, *Nees.*

V. candelabrum, *Bon.* On rotten wood.

V. compactiusculum, *Saccardo.* On decaying plants.

V. ampelinum, *Cke & Mass.* On living stem of *Vitis.*

V. lateritium, *Berk.* On decaying herbaceous stems.

V. candidum, *Peck.* On fallen pine leaves.

V. buxi, *Ancrsw.* On dead box leaves.

V. rufum, *Rabenh.* On decaying beet.

Acrostalagmus, *Corda.*

A. cinnabarinus, *Corda.* On decaying plants.

Trichothecium, *Link.*

T. roseum, *Link.* On dead bark, decaying fruit, &c.

T. candidum, *Wallr.* On dead bark.

Cephalothecium, *Corda.*

C. curtum, *Corda.* On dead pine leaves.

Arthrobotrys, *Corda.*

A. rosea, *Mass.* On rotten wood.

Mycogone, *Link.*

M. rosea, *Link.* On decaying agarics.

M. cervina, *Ditm.* On decaying *Peziza.*

Ramularia, *Fckl.*

R. lactea, *Fckl.* On living leaves of *Viola odorata.*

R. Hellebori, *Fckl.* On *Helleborus foetidus.*

R. variabilis, *Fckl.* On living leaves of *Verbascum Thapsus.*

Helicomyces, *Link.*

H. tubulosus, *Riess.* On rotten wood.

Dactylium, *Nees.*

D. dendroides, *Fries.* On a decaying Agaric.

Mucrosporium, *Preuss.*

M. sphaerocephalum, *Sacc.* On dead bark.

Dactylaria, *Sacc.*

D. Orchidis, *Cke. & Mass.* On decayed leaves of *Oncidium macranthum.*

CONIOSPOREAE.

Coniosporium, *Link.*

C. Arundinis, *Saccardo.* On *Arundo Donax.*

C. olivaceum, *Link.* On wood.

TORULEAE.

Torula, *Pers.*

T. monilioides, *Corda.* On rotten wood.

T. pulveracea, *Corda.* On rotten wood.

T. Herbarum, *Link.* On dead herbaceous stems.

T. gyrosa, *Cke. & Mass.* On rotten pine wood.

T. antennata, *Pers.* On rotten wood.

T. ovalispora, *Berk.* On rotten wood.

T. Graminis, *Corda.* On dead grass leaves.

T. asperula, *Saccardo.* On damp paper.

ECHINOBOTRYEAE.

Echinobotryum, *Corda.*

E. atrum, *Corda.* On rotten wood.

PERICONIEAE.

Stachybotrys, *Corda.*

S. atra, *Corda.* On damp paper.

S. lobulata, *Berk.* On damp paper.

S. asperula, *Mass.* On damp packing paper.

S. minima, *Cke.* On damp paper.

ARTHRINEAE.

Arthrinum, *Kunze.*

A. caricicolum, *Kunze.* On dead leaves of *Carex.*

Goniosporium, *Link.*

G. puccinioides, *Link.* On dead leaves of grass.

TRICHOSPORIEAE.

Trichosporium, *Fries.*

T. umbrinum, *Saccardo.* On rotten bark.

T. fuscum, *Saccardo.* On pine bark.

T. inosculans, *Sacc.* On dead wood.

Zygodesmus, *Corda*

Z. fuscus, *Corda.* On rotten wood.

MONOTOSPOREAE.

Monotospora, *Fries.*

M. sphaerocephala, *Berk. & Broome.* On decaying vegetation.

M. repens, *Mass.* On dead plants.

M. pumila, *Mass.* Parasitic on *Graphium flexuosum.*

M. asperospora, *Cke. & Mass.* On dead branches of *Clematis.*

Hadrotrichum, *Fckl.*

H. arundinaceum, *Cke. & Mass.* On dead *Arundo conspicua.*

Acremoniella, *Saccardo.*

A. fusca, *Saccardo.* On rotten wood.

HAPLOGRAPHEAE.

Haplographium, *Saccardo.*

H. Chartarum, *Saccardo.* On wet paper.

Dematium, *Pers.*

D. hispidulum, *Fries.* On dead leaves of *Arundo Donax.*

D. vinosum, *Mass.* On damp gummed paper.

D. effusum, *Sacc.* On damp paper.

MYXOTRICHEAE.

Bolacotricha, *Berk. & Broome.*

B. grisea, *Berk. & Broome.* On decaying sacking.

Myxotrichum, *Kunze.*

M. Chartarum, *Kunze.* On damp paper.

BISPOREAE.

Bispora, *Corda.*

B. monilioides, *Corda.*

STACHYLIDIEAE.

Gonytrichum, *Nees.*

G. caesium, *Nees.* On dead bramble stem.

Stachylidium, *Link.*

S. extorre, *Sacc.* On dead bramble stem.

CLADOSPORIEAE.

Polythrincium, *Kunze.*

P. Trifolii, *Kunze.* On living leaves of *Trifolium medium.*

Cladosporium, *Link.*

C. epiphyllum, *Mart.* On dead leaves of various trees.

C. sphaerosporum, *Penzig.* On leaves of *Citrus.*

C. Herbarum, *Link.* On decaying herbaceous plants, fungi, &c.

C. nodulosum, *Corda.* On rotten wood.

C. fasciculare, *Fries.* On stems of *Lilium auratum.*

C. Orchidearum, *Cke. & Mass.* On leaves of many species of cultivated orchids.

CLASTEROSPORIEAE.

Clasterosporium, *Schw.*

C. fasciculare, *Saccardo.* On dead wood.

C. capsuliferum, *Sacc.* On *Catalpa bignonioides.*

C. Fungorum, *Saccardo.* On the hymenium of living *Corticium molle.*

HELMINTHOSPORIEAE.

Helminthosporium, *Link.*

H. velutinum, *Link.* On rotten wood.

H. exasperatum, *Berk. & Broome.* On fading leaves of *Dianthus deltoides* and other caryophyllaceous plants.

H. macrocarpum, *Grev.* On dead wood.

H. fusiforme, *Corda.* On wood.

H. apiculatum, *Corda.* On wood.

H. sphaerosporum, *Penz.* Parasitic on leaves of *Clerodendron.*

H. Smithii, *Berk. & Broome.* On dead holly.

H. densum, *Sacc. & Roum.* On dead branch of *Morus alba.*

Brachysporium, *Saccardo.*

B. stemphylioides, *Corda.* On dead wood.

B. apicale, *Berk. & Broome.* On dead branches.

B. obovatum, *Berk.* On rotten wood.

B. ellipticum, *Berk. & Broome.* On rotten wood.

B. solani, *Mont.* On fading leaves of *Soldanella.*

Cercospora, *Fresenius.*

C. Calthae, *Cke.* On fading leaves of *Caltha palustris.*

C. moricola, *Cke.* On leaves of *Morus rubra.*

C. concentrica, *Cke.* On leaves of *Yucca filamentosa* and *Y. gloriosa.*

Heterosporium, *Klotzsch.*

H. echinulatum, *Cke.* On living leaves of species of *Convallaria, Scilla,* and *Smilax.* When abundantly developed, this species proves to be an injurious parasite, destroying the foliage.

H. variabile, *Cooke.* On *Primula Auricula.*

H. Laricis, *Cke. & Mass.* On larch leaves.

H. minutulum, *Cke. & Mass.* On living leaves of *Chamaerops humilis.*

Heterosporium Typharum, *Cke. & Mass.* On living leaves of *Typha angustifolia.*

H. epimyces, *Cke. & Mass.* On old specimens of *Polyporus squamosus*, *Boletus felleus*, and *Russula nigricans.*

Tetraploa, *Berk. & Broome.*

T. aristata, *Berk. and Broome.* On dead grass.

MACRONEMEAE.

Stemphylium, *Wallr.*

S. asperosporum, *Cke. & Mass.* On damp paper.

Macrosporium, *Fries.*

M. commune, *Rabh.* On decaying plants.

M. Sarcinula, *Berk.* On decaying *Paeonia albiflora.*

M. nobile, *Vize.* On decaying leaves of *Dianthus.*

M. Tomato, *Cooke.* On living leaves and fruit of *Lycopersicum esculentum.*

M. Alliorum, *Cke. & Mass.* On fading leaves of *Allium.*

M. Convallariae, *Fries.* On fading leaves of *Polygonatum multiflorum.*

Fumago, *Pers.*

F. vagans, *Pers.* Forming sooty patches on leaves of *Ulmus campestris.*

HELICOSPOREAE.

Helicosporium, *Nees.*

H. viride, *Saccardo.* On decaying birch wood.

STILBEAE.

Stilbum, *Tode.*

S. tomentosum, *Schr.* Parasitic on *Trichia varia.*

S. vulgare, *Tode.* On rotten wood.

S. erythrocephalum, *Ditm.* On rabbit dung.

S. vaporarium, *Berk. & Broome.* On wood.

S. fimetarium, *Berk. & Broome.* On rabbit dung.

S. turbinatum, *Tode.* On rotten wood.

S. citrinellum, *Cke. & Mass.* On fading leaves of *Lycopodium.*

Isaria, *Pers.*

I. citrina, *Pers.* On decaying *Polyporus.*

I. farinosa, *Pers.* On a buried chrysalis.

I. sulfurea, *Fiedl.* On birds' dung.

Atractium, *Link.*

A. flammeum, *Berk.* On willow bark.

Sporocybe, *Fries.*

S. atra, *Saccardo.* On dry leaves of *Holcus mollis.*

Graphium, *Corda.*

G. graminum, *Cke. & Mass.* On dead leaves of *Cortaderia argentea.*

G. Passerini, *Saccardo.* On dead stems of *Cortaderia argentea.*

G. subulatum, *Saccardo.* On bark.

G. anomalum, *Sacc.* On decaying leaves.

G. penicillioides, *Corda.* On rotten wood.

G. flexuosum, *Saccardo.* On bark.

Stysanus, *Corda.*

S. Stemonites, *Corda.*

Arthrobotryum, *Cesati.*

A. atrum, *Berk. & Broome.* On fallen branches.

TUBERCULARIEAE.

Tubercularia, *Tode.*

T. vulgaris, *Tode.* On dead branches.

T. versicolor, *Saccardo.* On dead branches of *Buxus sempervirens*, which were probably killed by the fungus.

T. subpedicellata, *Schw.* On dead branches of *Syringa.*

T. Ligustri, *Cke.* On dying branches of *Ligustrum ovalifolium.*

T. Euonymi, *Roum.* On branches of *Euonymus europaeus.*

T. expallens. *Fries.* On dead branches of *Aesculus Hippocastanum.*

T. Aesculi, *Opiz.* On branches of *Aesculus Hippocastanum.*

T. Sambuci, *Corda.* On branches of *Sambucus nigra.*

T. confluens, *Pers.* On branches of *Acanthopanax spinosum.*

Tubercularia Herbarum, *Fries.* On *Rhus glabra*, var. *laciniata.*

T. sarmentorum, *Fries.* On twigs of *Catalpa bignonioides.*

Illosporium, *Mart.*

I. Curreyi, *Sacc.* On dead leaves.

Aegerita, *Pers.*

A. candida, *Pers.* On damp elder bark.

Volutella, *Tode.*

V. ciliata, *Fries.* On decaying *Crocus* corms.

V. Hyacinthorum, *Berk.* On decaying hyacinth bulbs.

V. setosa, *Berk.* On dead stems of *Lilium candidum.*

V. roseola, *Cooke.* On dead beech branches.

V. melaloma, *Berk. & Broome.* On dead iris leaves.

Bactridium, *Kunze.*

B. flavum, *Kunze.* On rotten wood.

Fusarium, *Link.*

F. pyrochroum, *Saccardo.* On dead branches.

F. viticola, *Thum.* On branches of *Vitis inconstans.*

F. diffusum, *Carm.* On dead thistle stems.

F. roseum, *Link.* On decaying vegetable matter.

F. inseptatum, *Schwz.* On *Daphne Genkwa.*

F. heterosporum, *Nees.* On the inflorescence of *Holcus mollis.*

F. bulbigenum, *Cke. & Mass.* On bulbs of *Narcissus.*

Pionnotes, *Fries.*

P. baisolettiana, *Corda.* On adventitious roots of cherry laurel.

Epicoccum, *Link.*

E. vulgare, *Corda.* On decaying herbaceous stems.

E. granulatum, *Penzig.* On *Sorghum cernuum* and *Scirpus Eriophorum.*

E. neglectum, *Desm.* On leaves of *Phragmites* and *Scirpus Eriophorum.*

E. Herbarum, *Corda.* On dead leaves of *Typha angustifolia.*

E. purpurascens, *Ehrh.* On decaying stems of *Cortaderia argentea.*

Myrothecium, *Tode.*

M. roridum, *Tode.* On decaying vegetable matter.

M. inundatum, *Tode.* On decaying *Boletus luridus.*

Exosporium, *Link.*

E. Tiliae, *Link.* On bark of *Tilia vulgaris.*

APPENDIX.

MYXOGASTRES.

A very beautiful group of organisms, remarkable alike for beauty of form, brilliancy of coloration, and their remarkable life-history. Most of the species are minute, and are not uncommon on rotten wood, moss, &c. There is a difference of opinion as to the affinities of this group, which by some authorities is considered as related to Fungi, whereas others place it in the Animal Kingdom. Coloured figures, along with descriptions of all the British species, are contained in "A Monograph of the Myxogastres." Twenty-five genera and fifty species have been collected in the grounds, just about half the number known to occur in Britain.

TUBULINEAE.

Tubulina, *Pers.*

T. cylindrica, *Rost.* On dead wood.

T. effusa, *Mass.* On rotten wood.

Enteridium, *Rost.*

E. olivaceum, *Rost.* On stumps.

CRIBRARIAE.

Cribraria, *Pers.*

C. intricata, *Schrad.* On rotten wood.

C. argillacea, *Pers.* On wood.

C. aurantiaca, *Schrad.* On fallen branches.

Dictydium, *Schrad.*

D. cernuum, *Nees.* On rotten wood.

STEMONITEAE.

Stemonitis, *Gled.*

S. fusca, *Rost.* On rotten wood.

S. typhina, *Mass.* On rotten wood.

S. friesiana, *De Bary.* On dead leaves.

Brefeldia, *Rost.*

B. maxima, *Rost.* On fallen trunks.

Reticularia, *Bull.*

R. Lycoperdon, *Rost.* On wood and bark.

LAMPRODERMEAE.

Lamproderma, *Rost.*

L. violaceum, *Rost.* On living *Hypnum.*

L. irideum, *Mass.* On dead leaves.

L. arcyrioides, *Rost.* On rotten wood.

ARCYRIEAE.

Perichaena, *Fries.*

P. corticalis, *Rost.*

Lycogala, *Micheli.*

L. epidendrum, *Rost.* On fallen trunks.

Prototrichia, *Rost.*

P. cuprea, *Mass.*

P. flagellifera, *Rost.* On dead wood.

Arcyria, *Hill.*

A. punicea, *Rost.* On rotten wood.

A. incarnata, *Rost.* On dead bark.

A. nutans, *Rost.* On rotten wood.

A. cinerea, *Mass.* On dead wood.

TRICHEAE.

Oligonema, *Rost.*

O. nitens, *Rost.* On dead bark.

Trichia, *Haller.*

T. fragilis, *Rost.* On dead wood.

T. varia, *Rost.* On dead moss.

T. abrupta, *Cke.* On dead wood.

T. scabra, *Rost.* On dead wood.

T. fallax, *Rost.* On rotten wood.

DIDYMEAE.

Chondrioderma, *Rost.*

C. floriforme, *Rost.* On mosses.

C. difforme, *Rost.* On dead hawthorn leaves.

Didymium, *Schrad.*

D. farinaceum, *Schrad.* On living moss.

D. squamulosum, *Fries.* On dead leaves.

D. microcarpon, *Rost.* On dead leaves.

D. Clavus, *Rost.* On dead twigs.

D. Serpula, *Fries.* On dead oak leaves.

Lepidoderma, *De Bary.*

L. tigrinum, *Rost.* On rotten wood.

Spumaria, *Pers.*

S. alba, *DC.* On living grass.

Diachaea, *Fries.*

D. leucopoda, *Rost.* On dead leaves.

PHYSAREAE.

Craterium, *Trent.*

C. confusum, *Mass.* On dead grass.

C. aureum, *Rost.* On dead bark.

Physarum, *Pers.*

P. leucopus, *Rost.* On dead wood.

P. leucophæum, *Fries.* On dead twigs and moss.

P. cinereum, *Rost.* On dead twigs.

P. contextum, *Rost.* On bark and moss.

P. cerebrinum, *Mass.* On wood and soil in a pot containing palm seeds from Java. Probably an introduced species. (*Monogr. Myx.*, p. 306, fig. 275.)

P. sinuosum, *Rost.* On rotten wood.

Badhamia, *Berk.*

B. macrocarpa, *Rost.* On dead bark.

B. punicea, *Rost.* On twigs.

B. varia, *Mass.* On wood.

B. nitens, *Berk.* On rotten wood.

Tilmadoche, *Rost.*

T. nutans, *Rost.* On rotten wood.

Leocarpus, *Rost.*

L. fragilis, *Rost.*

Fuligo, *Rost.*

F. varians, *Rost.* On heap of dead leaves.

DICTYOSTELIAE.

Dictyostelium, *Brefeld.*

D. mucorioides, *Brefeld.* On dung.

6. ALGAE.

By F. E. Fritsch, D.Sc., Ph.D., F.L.S.

A detailed account of the Algae, occurring in the clearly-defined area of a botanic garden, has up to the present only rarely been published. The most important work of this nature is De Wildeman's "Les Algues de la Flore de Buitenzorg," published in 1900, which, although in reality taking into consideration the entire algal flora of Java, gives a comprehensive account of the Algae found more especially in the gardens at Buitenzorg. Such a flora is not likely to differ very greatly from that of the surrounding parts of the country, since the conditions offered in the greenhouses are not very unlike those generally found in the tropics.

The algal flora of the gardens at Kew, however, must necessarily be influenced by factors which do not affect the flora of the immediate surroundings; in the greenhouses, for instance, conditions prevail, which are often sufficient to favour the development of an entirely different flora. A large number of the forms occurring in the hothouses are found only there, where suitable conditions as regards temperature and moisture are provided for

them. This hothouse flora, which does not differ greatly in character throughout Europe, has been examined casually by a considerable number of algologists with the result that in any of the leading floras (Rabenhorst, Kirchner, &c.) a number of species, which have as yet not been observed elsewhere, are included. Observations of this kind having been extended over many years, it is not surprising that very few new forms have been met with at Kew.

If compared with that of any other local British algal flora the following list will immediately be found to present one very striking character. This is the relative abundance of the blue-green forms (Cyanophyceae). The composition of the flora may be mentioned at once, so as to illustrate this feature :—

	—	Gen.	Spec.
	Rhodophyceae	1	1
Chlorophyceae.	Heterokontae	5	10
	Stephanokontae	1	6
	Isokontae	46	78
	Akontae (Conjugatae)	14	52
	Cyanophyceae	29	72
	Bacillariales	28	67
	Flagellatae	6	8
	Total	130	294

It will be seen that the Cyanophyceae constitute nearly 25 per cent. of the entire flora, whereas in other algal floras the percentage is generally much less. We shall see immediately how this is to be accounted for.

The algal flora of Kew Gardens may be said to be composed of three elements, although possibly the two latter should be included under one heading. They may be described as :—

(i.) The *greenhouse-flora*, consisting for the chief part of blue-green Algae. It is to the presence of this element that their predominance in the list of species is due, and, as just mentioned, it is this factor which chiefly distinguishes the algal flora of a botanic garden from that of any other locality.* This greenhouse-flora is best developed in the houses, which are kept at a high temperature, and above all things are frequently well flooded with water. Probably the best example at Kew is to be found in the *Nepenthes* house; here the walls, the ledges, and the rocks are all

* It is possible that some of the Cyanophyceae found in the hothouses are introductions with the higher plants in cultivation there.

covered with Cyanophyceae, either in the form of olive, green, or brownish gelatinous clumps, or as incrustations of the most varied shades of blue and black, whilst the practical absence of Chlorophyceae is very noticeable. In the Aroid house (No. 1), which is also subjected to a moist heat, the north wall especially, is covered by a mass of Algae, in part olive-gelatinous, in part forming a black incrustation. The tropical fern house (No. 2), the tropical Orchid house (No. 13), and many of the forcing-pits are also rich in blue-green forms. In the palm house the air is not sufficiently moist for a considerable development of this flora. The tanks in the houses mentioned, on the other hand, present a very monotonous green flora, consisting of members of the Cladophoraceae, with which a few unicellular forms and Diatoms are interspersed. One or other of the species of *Lyngbya* usually forms a laminose coating all over the sides of the tanks.

(ii.) The *Thames-flora*, consisting of the Algae in the artificial waters in the open (lake, pond, &c.), as well as in the tanks of many of the greenhouses. All the water used at Kew is derived more or less directly from the river, and as a consequence the species found in these waters are practically the same as those to be found in the river, although the relative quantity of individuals is often very different (*see* below). Even the larger tanks in the greenhouses (*Victoria Regia* tank, the tanks of the water-lily house) show the same constituents, and I have scarcely observed a single species in their waters that might certainly be said to have been introduced with the higher plants cultivated there. However, *Pithophora Kewensis*, Wittr., which in former years was discovered in the tank of the water-lily house, may be mentioned as an example to the contrary. This species was found by Wittrock, and has as yet been found nowhere else; it is believed to have been introduced with plants from Brazil.

The Thames-flora consists of a large number of confervoid Algae and of numerous minute (unicellular or few-celled) species, amongst which the genera *Scenedesmus* and *Pediastrum* are particularly common. The plankton of all the waters at Kew in its composition absolutely resembles that of the Thames.

(iii.) The *terrestrial flora*, made up of the species growing on damp ground (*Prasiola*, *Nostoc*) and rocks (*Nostoc*, *Gloeocapsa*, &c.), and those growing on trees, &c. (*Pleurococcus*, *Chlorococcum*), in the open air.

The greenhouse flora is practically equally developed all the year round, whereas the flora outside shows its maximum development during August and September. During the winter it is in fact rather poor; all the smaller Algae (*Protococcoideae*, &c.) are absent, including the Desmids and most of the other Conjugates, *Spirogyra crassa* being the only species that can be met with all the year round. Desmids begin to appear in March, and species of *Scenedesmus* and *Pediastrum* at the beginning of April or a little earlier. Even in the tanks in the warmer houses (*e.g.*, water-lily house, *Victoria Regia* house) this periodicity is observable. Desmids and other Conjugates are very rare before April, although some of the unicellular Protococcoideae are here to be found all the year round.

In the aquatic tank near the Jodrell laboratory (briefly styled laboratory-tank in the subjoined list) a regular sequence of algal forms was observed, as will be seen from the following table :—

—	January.	February.	March.	April.	May.	June.	July.	August.	September.
Characium Sieboldi	—	—	—	—	—	—	—	+	+
Chlamydomonas pulvisculus ..	—	—	—	+	+	+	+	+	+
Chaetophora endiviaefolia ..	—	+	+ ?	—	—	—	—	—	—
Draparnaldia plumosa	—	—	—	—	+	+	+	+	—
Mesocarpus pleurocarpus .. .	—	—	+	+	—	—	—	—	—
Spirogyra crassa	+	+	+	+	+	+	+	+	+
„ condensata	—	—	—	—	—	+	+	—	—
„ longata	—	—	—	—	—	+	+	+	—
Closterium acerosum	—	—	—	—	+	+	+	+	+
Sphaeroplea annulina	—	—	—	—	+	+	—	—	—
Cladophora fracta	—	—	—	—	—	+	+	+	+
Ulothrix radicans	—	—	—	—	+	—	—	—	—
Sciadium arbuscula	—	—	—	—	—	—	—	—	+
Tetraspora lubrica	—	—	—	—	—	—	+	+	—

The first interesting form which appeared was *Chaetophora endiviaefolia*, which utterly disappeared after the tank was cleaned out in April. A few weeks after this *Draparnaldia plumosa* and *Sphaeroplea annulina*, the latter of which had been abundant at the same spot in former years, put in an appearance, to be to a great extent superseded by two species of *Spirogyra* in the next month ; finally, in July, *Tetraspora lubrica* appeared and has again vanished.

Undoubtedly this great change in the vegetation of the tank in successive months is partly due to the mass of Algae, which collects every few weeks, being removed, room being thus furnished for the growth of other species. In connection with this the sudden appearance of *Chantransia pygmaea* in the middle tank of the water-lily house, a fortnight after it had been cleaned out, may be mentioned. However, other Algae show a periodical development without any such agency coming into play. Thus *Oscillaria nigra* first appeared in the water-lily pond in July ; in September it was far the most important constituent of its algal flora, occurring in such quantity as to attract the attention of anyone passing by, and quite masking the *Cladophora*, which in earlier parts of the year is the most abundant Alga here.

Much has already been written on the periodicity of certain plankton organisms (*Clathrocystis*, *Anabaena flos aquae*, &c.), but as far as I am aware too little attention in this respect has been paid to those inhabiting the deeper regions of the water.

It is interesting in this connection alone to compare the winter with the summer flora. Species of the hardy genera of Algae (*Cladophora*, *Rhizoclonium*, *Oedogonium*, *Ulothrix*) are generally to be found just as commonly in winter as in summer, if not in such considerable quantity; but the more delicate species only put in an appearance when the temperature and, what is probably more important, the amount of light* has increased. Much can be said on this subject, but I must here confine myself to the statements made.

The plankton of the artificial waters at Kew is, as has already been mentioned, in its general character almost the same as that of the Thames, and for this reason I have included species found in the plankton of the river at Kew in my list. In quantity of individuals, however, the difference is very striking; whereas the Thames plankton consists for the most part of Diatoms, amongst which the other forms are sparsely scattered, in the plankton of the waters at Kew the green Algae (especially *Volvocineae*, *Pediastrum*, and *Scenedesmus*) play a very important part and considerably exceed the Diatomaceae in number. This striking difference in the quantitative development of the plankton in rivers and ponds has already been pointed out by Zacharias and others. On the whole, however, the plankton of the artificial waters at Kew is rather poor.

If the composition of the flora, as tabulated on page 188, be once more referred to, it will be noticed that the number of species of Desmids found at Kew is relatively small. This is most probably due to the calcareous nature of the Thames water, possibly also to its salinity. Only *Closterium* and *Cosmarium* are at all well represented. Of the large genus *Staurastrum* only six species, of *Euastrum* only one species was found, whilst *Micrasterias*, *Desmidium*, &c., are quite absent.

The entire absence of Peridineae is worthy of note.

*   *   *   *   *

The Algae in the subjoined list were for the most part collected by me from the beginning of December, 1901, to October, 1902. As the collecting was carried out in different parts of the gardens almost daily, not many of the forms present this year will have escaped me. A preliminary list of Algae, collected by Mr. C. H. Wright, A.L.S., and Mr. G. Massee, F.L.S., was placed in my hands at the commencement of this investigation; many of these have been found again this year, but some twenty I quote on their authority. These species have been marked with an asterisk. In addition to these the late Mr. A. W. Bennett, F.L.S., in the Journal of the Royal Microscopical Society, 1897, p. 511, mentions a number of Algae he had found at Kew, which have also been adopted in the present list.

A few words on the system of classification adopted may be added. For many years the old system of classifying Algae has been felt to be inadequate, and in recent years an attempt has

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* Cp. Zacharias, Über die Ursache der Verschiedenheit des Winterplanktons in grossen u. kleinen Seen. Zoologischer Anzeiger, Bd. xxii., 1889, pp. 26 and 27.

been made to establish a new classification, based on the nature of the product of assimilation and on the structure of the zoospores. This system, as at present extant, is mainly due to the efforts of Bohlin*, who has published several interesting papers on this subject during the last few years. Quite recently Blackman and Tansley† have commenced to publish a "Revision of the Classification of the Green Algae," based on Bohlin's system with a few slight alterations. Some of these I have also adopted in my list; in other cases I have followed Bohlin's views. Although far from being perfect, the present system expresses much more clearly than the old one did the current ideas on the phylogenetic relationships of the green Algae.

For the Cyanophyceae I have mainly followed the classification in Cooke, British Freshwater Algae. The Diatoms are arranged according to Rabenhorst, Flora Algarum Europaeum, Vol. I.

Full descriptions and figures of the new forms found will be given in one of the next numbers of Annals of Botany, in which one or two doubtful forms will also be discussed.

Finally I have to thank Prof. Dr. Chodat, of Geneva, for his kind assistance in the determination of certain plankton forms, collected at the beginning of April. My friend Mr. L. A. Boodle, F.L.S., has frequently given me valuable advice on difficult determinations, and it is a great pleasure to me to acknowledge and thank him for his extreme kindness.—Jodrell Laboratory, Kew, October 18th, 1902.

I. RHODOPHYCEAE.

BATRACHOSPERMEAE.

Chantransia, *Fries*, 1825.

C. pygmaea, *Kütz. Phyc. Gen.* 285. Formed large numbers of small round tufts on the stone sides of the middle tank of the water-lily house (No. 15) during March, 1902. This species appeared some few weeks after the tank had been cleaned out, numerous dark red patches interrupting the stratum of *Lyngbya*, which covered its sides. Monospore-formation was going on. The *Chantransia* disappeared again after a few weeks, and I have not met with it since. No other member of the Florideae has been found to take its place, although some species of this genus have been asserted to be only stages in the development of *Batrachospermum*, &c.

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* Cp. Bohlin, Utkast till de gröna algernas och arkegoniaternas fylogeni, Upsala, 1901.

† The New Phytologist, Vol. I, 1902. Prof. Tansley very kindly sent me an outline of that part of the revision which had not yet appeared in print, for which I desire to express my best thanks.

II. HETEROKONTAE.

Series I. Vaucheriales.

VAUCHERIACEAE.

Vaucheria, *DC.*, 1805.

V. Dillwynni, *Ag. Syst.*, 173. On damp ground near the water-lily pond, April, 1902.

V. sessilis (*Vauch.*), *DC. Flor. Fr.*, II., 63. On rocks below and above water in the temperate house pool, March, 1902 ; in the side tanks of the water-lily house, April, 1902 ; in a glass vessel with *Azolla* in the Herb. Dptmt., June, 1902. Sexual organs were present in every case (cp. also Bennett in Journ. Roy. Micr. Soc., 1897, 511).

V. geminata (*Vauch.*), *DC. loc. cit.*, 62. In the side tanks of the water-lily house, fruiting in April, 1902.

Var. **racemosa**, *Walz.* Lake, April, 1902. The curious sexual branches were well developed.

***V. hamata** (*Vauch.*), *Lyngb. Hydroph.*, 77, *t.* xx., *fig.* c. On soil in plant pot (Massee !).

***V. terrestris**, *Lyngb. loc. cit.*, 77. On soil in plant pot (Massee !).

***V. sphaerospora**, *Nordst. Bot. Notis.* 1878, 177, *t.* 2. Thames at Kew (cp. Cooke in Journ. Quekett Micr. Club, ser. 2, vol. 2, p. 219 !).

Series II. Confervales.

1. BOTRYDIACEAE.

Botrydium, *Wallr.*, 1815.

***B. granulatum**, *L.* "On mud on shore of lake, common during some seasons." (Massee !)

2. CONFERVACEAE.

Conferva (*Linn.*), *Link*, 1820.

C. bombycina, *Ag. Syst.*, 83. Formed a compact green layer on outside ledge of water-lily house, 1902. The cells of this species were generally filled with granules of oil ; no starch was present (cp. Wille in Nat. Pfl. I, 2, p. 85).

Sciadium, *Braun*, 1855.

S. arbuscula, *Braun Alg. Unicell.*, 106, *t.* 4. On *Cladophora* in laboratory tank, September, 1902 (isolated).

Ophiocytium, *Näg.*, 1849.

***O. cochleare** (*Eichw.*), *Braun loc. cit.*, 54. Lake (Massee !). *O. circinatum*, Wolle, was observed in the higher reaches of the Thames, and a close search would probably also disclose it in the river at Kew.

III. STEPHANOKONTAE.

OEDOGONIACEAE.

Oedogonium, *Link*, 1820.

O. Vaucherii (*Le Clerc*), *Braun Chytr.*, 381, *t.* 2, *f.* 13. In the temperate house pools; with oogonia in April, 1902; disappeared in May, 1902.

O. capillare (*Linn.*), *Kütz. Phyc. Gen.*, 225, *t.* 12, *f.* 1–10. Growing on *Nitella syncarpa*, contained in a glass vessel in one of the pits, April, 1902. This species is curious in that the apical cell of each filament is provided with a tip, which is formed before or at the same time as the root on the developing zoospore. During the summer months this species has been slowly dying; it is now practically colourless, the cells being crowded with starch granules (cp. Annals of Botany, vol. xvi., 1902, 481).

O. calcareum, *Cleve in Wittr. Disp. Oedog.*, 135. In the warm tanks of the water-lily house, with oogonia, April, 1902; also in *Victoria Regia* tank (cp. Cooke, Brit. Freshw. Algae, 165). This species was always found coated with a considerable deposit of carbonate of lime, giving its cells a rugged, black, granular appearance. March–September, 1902.

O. cardiacum (*Hass.*), *Wittr. loc. cit.*, 135. Growing on the leaves of *Vallisneria spiralis* in the middle tank of the water-lily house, 1902. Only oogonia and oospores were observed.

O. stagnale, *Kütz. Spec. Alg.*, 368. Tank in Herb. Dptmt., June–September, 1902. Antheridia and young oospores observed. As far as I am aware this species has not yet been found in this country.

O. sp. With a water-moss from the river Severn in a glass vessel in the Herb. Dptmt., 1902. This species has remained sterile ever since I first observed it in April. Diam. of filaments = 4–5μ; cells about 4–5 times as long.

IV. CONJUGATAE (AKONTAE).

1. MESOCARPACEAE.

Mesocarpus, *Hass.*, 1845.

M. parvulus, *Hass. Freshw. Algae*, 166. Together with *Ulothrix* in tank of one of the pits, April, 1902. Zygospores not observed.

M. pleurocarpus, *De Bary Conj.*, 81, *t.* iii., *fig.* 14. Forming large yellowish-green floating masses in the lake, April–September, 1902; laboratory tank, 1902. Zygospores not observed.

2. ZYGNEMACEAE.

Mougeotia, *De Bary*, 1858.

***M. glyptosperma**, *De Bary Conj.*, 78, *t.* 8, *fig.* 20–25. Locality and date uncertain (Wright !).

Sirogonium, *Kütz.*, 1843.

S. sticticum, *Kütz. Phyc. gen.*, 278. Common at the north end of the lake in the early part of the year, 1902. Zygospores not observed.

Spirogyra, *Link.*, 1820.

S. crassa, *Kütz. loc. cit.*, 280, *t.* 14. *fig.* iv. Laboratory tank, all the year round; intermingled with *Zygnema pectinatum* in water-lily pond, June, 1902; moat, July, 1902. Zygospores not observed. This is the only species of *Spirogyra* to be found in the gardens during the winter months; the others only appear in March and April. A well-developed sheath is frequently to be found surrounding the filaments.

S. nitida (*Dillw.*), *Link, Handbk.*, iii., 262. Laboratory tank (Massee !); amongst other filamentous Algae in a tank in the Herb. Dptmt., with zygospores, June, 1902.

S. porticalis (*Vauch.*), *Cleve. Monogr. Zygn.*, 22, *t.* 5, *fig.* 8 *to* 13. Middle tank of water-lily house, June, 1902. A very variable species.

Var. a. **quinina**, *Cooke.* Lake, June, 1902. Zygospores not observed.

Var. b. **decimina**, *Cooke.* Temperate house pools, intermingled with other Algae, June, 1902. Zygospores not observed.

Var. c. **rivularis**, *Cooke.* *Victoria regia* tank; with zygospores, July, 1902.

S. condensata (*Vauch.*), *Ktz. Tab. Phyc.* v., *t.* 22, *fig.* iii. Laboratory tank, July, 1902; moat, July, 1902. Zygospores not observed.

S. longata (*Vauch.*), *Ktz. Phyc. germ.*, 222. Laboratory tank, June, 1902, with zygospores. The varieties *communis* and *turpis*, Cooke, were both present.

S. insignis (*Hass.*), *Ktz. Spec. Alg.*, 438, *n.* 12. Moat, May, 1902; with zygospores.

S. Weberi, *Ktz. Phyc. Gen.*, 279, *n.* 4, *t.* 14, *fig.* 3. On the stonework of the fountain in the pond, June, 1902. Zygospores not observed.

Form. a. **inaequalis**, *Cooke.* Laboratory tank, August, 1902.

Form. b. **subventricosum**, *Cooke.* Growing on leaves of *Vallisneria spiralis* in middle tank of water-lily house (15), June, 1902. With zygospores.

S. tenuissima (*Hass.*), *Ktz. Spec. Alg.*, 437. Temperate house pools; intermingled with *Sp. porticalis*, July, 1902. Zygospores not observed.

Zygnema, *Kütz.*, 1843.

Z. pectinatum, *Ag Syst.*, 78, *n.* 8. Moat, May, 1902; water-lily pond, June, 1902. Zygospores not observed.

***Z. stellinum** (*Vauch.*), *Ag. Syst.*, 77, *n.* 4. Locality and date unknown (Wright !).

3. DESMIDIACEAE.

Gonatozygon, *De Bary*, 1856.

G. Brebissonii, *De Bary Conj.*, 77, *t.* 4, *f.* 26, 27. Lake, July, 1902 (isolated).

Docidium, *Bréb.*, 1846.

***D. clavatum**, *Kütz. in Ralfs Desm.* (1848), 156, *t.* 26, *f.* 3. cp. Bennet in Journal of Royal Microscop. Society, 1897, 511 (!).

Closterium, *Nitzsch*, 1817.

C. lunula (*Müller*), *Ehrb. Abh.*, 1830. Laboratory tank, July, 1897 (Wright !); plankton of pond, April, 1892 (Chodat !); moat, May, 1902 (mihi).

C. acerosum, *Ehrb. Symb. Phys. Phyt.*, *t.* ii., *f.* 9. Plankton of pond and Thames, 1902; laboratory tank, May, 1902; temperate house pools, July, 1902.

C. Ehrenbergii, *Meneg. Syn. Desm.*, 232. Isolated amongst other Algae in side tanks of water-lily house (15), April, 1902; temperate house pools, June, 1902; streamlet in rockery, September, 1902.

> Var. **rubro-striolatum**, *nov. var.* Frond elongated; dorsal surface strongly convex, ventral slightly concave with a more or less conspicuous central inflation; considerably attenuated towards the obtuse ends. Large granules irregularly scattered, in considerable number in each half of the cell. *Empty frond reddish, usually distinctly striolate*, striae numerous, but distinguishable from one another; a conspicuous central suture present. Zygospore not observed. Breadth about 100 μ; length about 500 μ. Temperate house pools, amongst *Cladophora*, July, 1902; streamlet in rockery, September, 1902.

C. moniliferum, *Ehrb. Inf.*, 91, *t.* 5, *f.* 16. Plankton of Thames, August–September, 1902; moat, July, 1902.

C. Jenneri, *Ralfs Desm.*, 167, *t.* 28, *f.* 6. Lake, June, 1902.

***C. Leibleinii**, *Kütz. Syn. Diat.*, 595. cp. Bennett in Journal of Royal Microscopical Society, 1897, 511 (!).

C. Dianae, *Ehr. Infus.*, 92, *t.* 5, *f.* 17. Lake, May, 1902.

***C. costatum**, *Corda Alm. Carls.*, *t.* 5, *f.* 61-63. Lake, July 1897 (Wright !).

C. juncidum, *Ralfs Desm.*, 172, *t.* 29, *f.* 6. Isolated amongst other Algae in side-tanks of water-lily house, April, 1902.

C. lineatum, *Ehrb. Abh. Berl. Akad.*, 1833, 238. Temperate house pools, May, 1902.

***C. Ralfsii**, *Bréb. in Ralfs Desm.*, 174, *t.* 30, *f.* 2. Laboratory tank, August, 1897 (Wright !).

C. cornu, *Ehrb. Abh. Berl. Akad.*, 1830, 62. *Victoria Regia* tank, June, 1902.

C. linea, *Perty kleins. Lebens.*, 206, *t.* 16, *f.* 20. Isolated amongst other Algae in side tanks of water-lily house, April, 1902.

***C. eboracense**, *Turner in Trans. Leeds Nat. Club*, i., *t.* 1, *f.* 16 Laboratory tank, August, 1897 (Wright !).

C. acuminatum, *Ktz. Phyc. germ.*, 130, *n.* 4. Amongst *Nitella syncarpa* in a glass vessel in the Herb. Dptmt., February, 1902.

Penium, *Bréb.*, 1848

P. closterioides, *Ralfs Desm.*, 152, *t.* 34, *f.* 4. Plankton of lake, April, 1902 (Chodat !); laboratory tank, July, 1897 (Wright !).

Mesotaenium, *Näg.*, 1849.

M. chlamydosporum, *De Bary. Conj.*, 75, *t.* 7, *f.* D. Amongst Diatoms and *Oscillariae*, adhering to brickwork in pit, March–July, 1902.

Euastrum, *Ehrb.*, 1831.

E. venustum, *Bréb. Liste*, 124, *t.* 1, *f.* 3. Lake, May–September, 1902.

Cosmarium, *Corda*, 1835.

C. granatum, *Bréb. in Ralfs Desm.*, 96, *t.* 32, *f.* 6. Laboratory tank, May, 1902; tank in private grounds, May, 1902.

C. pseudopyramidatum, *Lund. Desm. Suec.*, 41, *t.* 2, *f.* 18. Amongst other Algae on the rocks in the pools of the temperate house, March, 1902.

C. gotlandicum, *Wittr. Sotv. Alg.*, 60, *t.* 4, *f.* 14. Temperate house pools, May, 1902; lake, June, 1902.

C. crenatum, *Ralfs Ann. Nat. Hist.*, xiv., *t.* 2, *f.* 6. Lake, April–September, 1902.

C. margaritiferum (*Turp.*), *Meneg. Syn. Desm.*, 219. Tank in private grounds, May, 1902; side tanks of water-lily house (15), June, 1902; plankton of Thames, August–September, 1902.

C. botrytis, *Meneg. Syn. Desm.*, 220. Amongst *Cladophora fracta* in temperate house pools, December, 1901 (mihi); laboratory tank, July, 1897 (Wright !).

***C. Broomei**, *Thw. in Ralfs Desm.*, 103, *t.* 16, *f.* 6; *t.* 32, *f.* 7. Laboratory tank, August, 1897 (Wright !).

C. quinarium, *Lund. Desm. Suec.*, 28, *t.* 2, *f.* 14. Lake, July, 1902.

C. isthmochondrium, *Nordst. Norges Desm.*, 12, *f.* 2. Lake, May–August, 1902.

C. moniliforme (*Turp.*), *Ralfs Desm.*, 107, *t.* 17, *f.* 6. Side tanks of water-lily house, June, 1902.

C. parvulum, *Bréb. Liste Desm.*, 133, *t.* 1, *f.* 18. In considerable quantity amongst other Algae on outside walls of water-lily house. March, 1902.

Calocylindrus, *De Bary*, 1858.

C. Thwaitesii (*Ralfs*), *Cooke Brit. Desm.*, 126, *t.* 44, *f.* 5. Side tanks of water-lily house (15), June, 1902.

Staurastrum, *Meyen.*, 1829.

S. striolatum, (*Näg.*), *Pritch. Infus.*, 740. Lake, August–September, 1902.

***S. punctulatum,** *Bréb. in Ralfs Desm.*, 133, *t.* 22, *f.* 1. Amongst *Zygnema* in laboratory tank (Massee !).

***S. alternans,** *Bréb. in Ralfs Desm.*, 132, *t.* 21, *f.* 7. Laboratory tank, July, 1897 (Wright !).

S. arcuatum, *Nordst. Norges Desm.*, 36, *f.* 18. Laboratory tank, July, 1897 (Wright !) ; Lake, September, 1902 (mihi).

S. polymorphum, *Bréb. in Ralfs Desm.*, 135, *t.* 22, *f.* 9 ; *t.* 34, *f.* 6. Lake, July, 1902.

S. paradoxum, *Meyen. Nov. Act. Leop.*, xiv., 43, *f.* 37, 38. Amongst *Cladophora* in pond, September, 1902. Diameter=32 μ.

V. CHLOROPHYCEAE (ISOKONTAE).

Series 1. Siphoneae.

1. SPHAEROPLEACEAE.

Sphaeroplea, *Ag.*, 1824.

S. annulina, (*Roth.*), *Ag. Syst.*, 76. "Occurred very abundantly in the tank near the laboratory in 1890, when the surface of the water was covered with an orange scum" (Massee !). I found it in May of this year, the tank having been cleaned out a few weeks before (cp. Massee, Journ. Linn. Soc., Vol. xxvii., 1889, 458). The red oospores were first met with, and soon after well-developed vegetative filaments were abundant. They were still present the following month, but have disappeared since then without producing any sexual organs. (cp. also Bennett in Journ. Roy. Microscop. Soc., 1897, 511.)

2. CLADOPHORACEAE.

Pithophora, *Wittr.*, 1877.

***P. Kewensis**, *Wittr. Mon.*, 52. "In tank, water-lily house, Kew Gardens, August. This singular plant is thought by Wittrock to have been an importation from Brazil. It has not been seen in its original locality for two or three years." (cp. Cooke, Brit. Freshw. Algae, 147.) I have not observed this species during this summer.

Cladophora, *Kütz.*, 1843.

C. fracta, (*Dillw.*), *Kütz. Sp. Alg.*, 410. Temperate house pools, December, 1901 ; laboratory tank, June, 1902 ; moat, July, 1902.

> Var. **gossypina**, *Kütz.* On the sides of a tank in house No. 8, September, 1902. The filaments were practically unbranched. This variety is new to the British Isles.

C. crispata, (*Roth.*), *Kütz. Tab. Phyc.*, iv., *t.* 40, *f.* 1. Forming dull green floating masses in the lake, April, 1902 ; moat, July, 1902 ; in a tank in the Herb. Dptmt., all the year round, 1902.

C. glomerata, (*Linn.*), *Kütz. Tab. Phyc.*, iv. Frozen in the ice of the water-lily pond, December, 1901.

C. flavescens, *Ag. Syst.*, 112. Water-lily pond, April, 1902.

C. canalicularis, (*Roth.*), *Kütz. Sp. Alg.*, 409. Side tanks of water-lily house and tank in one of the pits, April, 1902 ; temperate house pools, May, 1902.

Rhizoclonium, *Kütz.*, 1843.

R. hieroglyphicum, (*Ag.*), *Kütz. Sp. Alg.*, 385, *n.* 12. Common throughout the gardens ; forming a darkish-green web on the sides of a tank (above the level of the water) in one of the pits, February, 1902 ; temperate house pools, July, 1902 ; streamlet in rockery, September, 1902 ; also abundant in the moat, April, 1902.

Series 2. Ulothrichales.

1. COLEOCHAETACEAE.

Coleochaete, *Bréb.*, 1844.

C. scutata, *Bréb. Ann. Sci. Nat.*, 1844, 29, *t.* 2. On leaves of *Fontinalis* in moat, May, 1902; on water-plants in the lake, June, 1902. (cp. also Bennett, in Journ. Roy. Microscop. Soc., 1897, 511.)

2. CHAETOPHORACEAE.

Aphanochaete, *A. Braun*, 1851.

A. repens, *Braun Rejuv.*, 184. On *Cladophora* and *Mesocarpus* in lake, 1902 ; on *Cladophora flavescens*, Ag., in water-lily pond, April, 1902 ; pond, May, 1902 ; on *Cladophora crispata*, tank, Herb. Dptmt., September, 1902.

Endoderma, *Lagerh.*, 1883.

E. sp. (jadinianum, *Huber ?*). Growing between the lamellae of the membrane of a *Cladophora*, attached to the stone-work of the fountain in the pond, August, 1902. It seems possible that this is merely a stage in the development of a *Stigeoclonium*. Young plants of this genus with a creeping basal portion, whose large cells very much resembled those of the *Endoderma*, were common in the same locality, and belonged to *Stig. nanum* (Dillw.), Ktz. (cp. Fritsch in Beihefte. z. Bot. Centralbl. Vol. XIII., 380–383. Pl. XII.)

Draparnaldia, *Ag.*, 1824.

D. plumosa, (*Vauch.*), *Ag. Syst.*, 58. Laboratory tank, May, 1902. This species appeared soon after the tank had been cleaned out, and was present in great abundance at that end at which the inflow of water takes place ; it was present in smaller quantity at the outflow pipe. Since that time its place has been taken by other filamentous forms, but small quantities have remained throughout the summer.

Chaetophora, *Schrank*, 1789.

C. endiviaefolia, *Ag. Syst.*, 28. Growing under water on the brickwork of the laboratory tank, February, 1902. The tank was cleaned out soon after this species appeared, and I did not find it again afterwards.

Stigeoclonium, *Kütz.*, 1843.

S. farctum, *Berth.*, var. **simplex**, *Fritsch Beihefte Bot. Centralbl. Vol.* XIII., 376, *Pl.* XI. Growing on the leaves of *Vallisneria spiralis* in the middle tank of the water-lily house, May–August, 1902. This species forms a kind of basal disc, composed of creeping connate branches. The vertical filaments are unbranched.

S. tenue, *Ag. Syst.*, 57. Attached to the sides of a tank in the Herb. Dptmt., February, 1902 ; pond, March, 1902 (zoospores $=10\mu$ diameter at first, when spherical ; afterwards when elongated $= 23\mu \times 6, 5\mu$).

S. nanum, (*Dillw.*), *Ktz. Spec. Alg.*, 352. Pond, May, 1902.

S. fastigiatum (*Ralfs*), *Kütz. Tab. Phyc.*, iii., *t.* 8, *f.* 1. Attached to filamentous Algae in lake, January, 1902.

S. variabile, *Näg. in Ktz. Spec.*, 352, *n.* 3. *Victoria Regia* tank, May–September, 1902. Not before found in this country.

3. CHROOLEPIDACEAE.

Chroolepus, *Ag.*, 1824.

C. aureus (*Linn.*), *Kütz. Tab. Phyc.*, iv., *t.* 93. Forming a thin, silky, orange-coloured stratum on the woodwork of one of the pits, attached to the tropical fern house (No. 2). The filaments abounded in sporangia, September, 1902.

Microthamnion, *Näg.*, 1849.

M. kützingianum, *Näg. in Ktz. Spec. Alg.*, 352. Growing on a species of *Cladophora* in tank in one of the pits, March, 1902; on *Cladophora* in tank in No. 8, September, 1902.

4. ULOTHRICHACEAE.

Ulothrix, *Kütz.*, 1845.

U. moniliformis, *Kütz. Tab. Phyc.*, ii., *t.* 88. In a glass vessel in the Herb. Dptmt., containing a water-moss from the River Severn; intermingled with *Oedogonium*, *Mesocarpus*, &c., March, 1902.

U. zonata, *Kütz. loc., cit.* ii., *t.* 90, *f.* 2. Attached to old tree stumps in pond, March, 1902. The filaments were partly engaged in active zoospore-formation, and such filaments were coiled spirally in a very striking manner. (cp. Dodel, Die Kraushaar Alge, *Ulothrix zonata*, Pringsh. Jahrb. x. 1876, 6.) It is probable that several of the other species mentioned are only forms of *U. zonata*, Kütz.

U. bicolor, *Ralfs Alg. Exs.*, No. 13. On old leaves in middle tank of water-lily house, April, 1902; on leaves in *Victoria regia* tank, June, 1902.

U. variabilis, *Kütz. loc. cit.*, ii., *t.* 85, *f.* 3. On the outer walls of the palm house, forming a greenish-black scum, January, 1902; Queen's Cottage Grounds, January, 1902; on rocks, subject to the drip of water, in the temperate house pools, March–September, 1902. This species is nearly always to be found accompanied by *Protococcus viridis* or *Chlorococcum humicolum*.

U. tenerrima, *Kütz. loc. cit.*, ii., *t.* 87, *f.* 1. On ledges in palm house, intermingled with other Algae, March, 1902; tank in Herb. Dptmt., June, 1902.

U. radicans, *Kütz. loc. cit.*, ii., *t.* 95, *f.* 3. Laboratory tank, May, 1902.

U. parietina (*Vauch*), *Kütz. loc. cit.*, ii., *t.* 97, *f.* 1. On tree stumps in pond, January, 1902; on walls of Aroid house (No. 1), March, 1902. Usually found together with members of Protococcaceae.

5. MICROSPORACEAE.

Microspora, *Thur.*, 1851.

***M. floccosa** (*Ag.*), *Thur. Rech.*, *t.* 17, *f.* 4–7. Laboratory tank (Massee!).

6. ULVACEAE.

Enteromorpha, *Link*, 1820.

E. intestinalis (*Linn.*), *Link Hor. Ber.* (1820). Common in the lake, where it begins to appear during the month of June, and during the following months forms dense masses at certain points. During the winter months the dead tubes are washed up in great numbers on the banks in a more or less decayed condition. Also common in the moat. I have observed the same species in great abundance in a backwater of the Thames near Sunbury.

Var. **capillaris**, *Ktz.* Lake, May, 1902; moat, July, 1902. This seems to be merely a stage in the development of the adult form.

Prasiola, *Ag.*, 1821.

P. crispa, *Kütz. Tab. Phyc.*, v., *t.* 40, *f.* 6. "On damp ground, common" (Massee!); Kew Green, near church, September, 1902 (Darbishire!).

Series 3. Protococcoideae.

1. VOLVOCACEAE.

a. *Chlamydomonadeae.*

Chlamydomonas, *Ehrb.*, 1832.

C. pulvisculus, *Ehrb. Infus.*, 64. Plankton of lake and pond, April, 1902 (Chodat!); plankton of laboratory tank, April–September, 1902 (mihi!).

C. Braunii, *Gorosch. in Bull. Soc. Imp. d. Nat. d. Moscou*, 1890, No. 3, 498, &c. Plankton of pond, April, 1902 (Chodat!); plankton of lake, May, 1902 (mihi!). This species has not previously been found in this country.

Chlamydococcus, *Br.*, 1849.

C. pluvialis, *Br. Rejuv.*, 206. Laboratory tank, May, 1902.

Chlorogonium, *Ehrb.*

C. euchlorum, *Ehrb.* Plankton of pond, April, 1902 (Chodat!); *Victoria Regia* tank, May, 1902 (mihi!).

b. *Phacoteae.*

Coccomonas, *Stein*, 1878.

C. orbicularis, *Stein.* Pond, September, 1902.

c. *Volvoceae.*

Volvox, *Linn.*, 1758.

V. globator, *Linn. Syst.*, *Ed.* x. Very common in plankton of water-lily pond, April–August, 1902; rare in plankton of lake, June, 1902.

Eudorina, *Ehrb.*, 1832.

E. elegans, *Ehrb. Monats. Berl.*, 1831, 78. In the plankton of all the artificial waters, rather common; plankton of moat, May, 1902.

Pandorina, *Bory*, 1824.

P. morum, *Ehrb. Inf.*, 53, *t.* ii., *f.* 33. Common in the plankton of the artificial waters; not observed in the pond; resting-stage in water-lily pond, April, 1902; plankton of Thames, August–September, 1902.

Gonium, *Müller*, 1773.

G. pectorale, *Müll. Vermium*, 60. Common in the plankton of the artificial waters; moat, May, 1902. Four-celled coenobia were very frequently observed.

2. HYDRODICTYACEAE.

Hydrodictyon, *Roth.*, 1800.

***H. reticulatum,** (*L.*) *Lagerh.* "Tank, Kew Gardens; abundant in some years" (Bennett in Journ. Roy. Microscop. Soc. 1897, 511); "not uncommon in the lake" (Massee !).

Pediastrum, *Meyen*, 1829.

P. boryanum, *Turp. Rabh. Alg.*, iii., 74. Common in the plankton of the artificial waters, 1902; moat, July, 1902; plankton of Thames, August, 1902.

Var. **granulatum,** *Kütz.* Amongst *Oedogonium* and *Nitella* in a glass vessel in the Herb. Dptmt., March, 1902.

P. pertusum, *Kütz. Phyc. Germ.*, 143. Plankton of lake and water-lily pond, 1902; plankton of Thames, August, 1902.

Var. **clathratum,** *Braun Alg. Unicell.*, 93. Plankton of pond, lake, and middle tank of water-lily house (15), 1902; plankton of Thames, August, 1902.

P. Ehrenbergii (*Corda*), *Braun Alg. Unicell.*, 97, *t.* v., *f.* H. Moat, July, 1902; middle tank of water-lily house and water-lily pond, September, 1902.

3. TETRASPORACEAE.

Tetraspora, *Link.*, 1810.

T. gelatinosa (*Vauch.*), *Desv. Flor. Anger.*, 18. Lake, attached to the bottom; common during May–July, 1902.

T. lubrica (*Roth.*), *Ag.*, *Spec. Alg.*, i., 415, *n.* 11. Growing under water on the stonework of the laboratory tank, June–July, 1902. This species appeared suddenly, was very common during some weeks, and then disappeared again entirely.

Apiocystis, *Näg.*, 1849.

***A. brauniana,** *Näg. Einz. Alg.*, 69, *t.* iiA., *f.* 1. "In tank, attached to a species of *Spirogyra*" (Massee !).

Dictyosphaerium, *Näg.*, 1849.

***D. ehrenbergianum**, *Näg. Einz. Alg.*, 73, *t.* ii., E. "Open-air tank at Kew, mixed with *Spirogyra* and *Cladophora*," 1889. (Massee! cp. Journ. Linn. Soc., vol. xxvii., 1889, 458.) Not observed this year.

Botryococcus, *Ktz.*, 1849.

B. Braunii, *Kütz. Sp.*, 892. Plankton of Thames, August, 1902.

4. CHLOROCOCCACEAE.

Characium, *Braun*, 1847.

C. Sieboldi, *Braun Alg. Unicell.*, 32, *t.* 3, *f.* A., 1–21. Attached to a species of *Oedogonium*, growing on the stonework of the fountain in the pond, May, 1902 (active zoospore-formation was going on); attached to a water-plant, laboratory tank, August, 1902.

C. tenue, *Herm. in Rabh. Beitr.*, 26. Attached to *Cladophora* in tanks of water-lily house, April–September, 1902.

Chlorococcum, *Fries*, 1825.

C. humicolum (*Näg.*), *Rabh. Kr. Fl. Sachs.*, 137. On old wood, Queen's Cottage Grounds, January, 1902: forming a dark green pulverulent layer on the floor of *Victoria regia* House and on the floor of the temperate house, 1902; on old wood in bamboo garden, March, 1902. Nearly always together with some species of *Ulothrix*.

C. frustulosum (*Carm.*), *Rabh. Alg.*, iii., 59. Forming a pulverulent green coating on rocks in the rockery, March, 1902.

C. murorum (*Grev.*), *Rabh. Alg.*, iii., 61. On brickwork in tropical fern house (No. 2), January, 1902; outside walls of temperate house, February, 1902.

5. PLEUROCOCCACEAE.

Crucigenia, *Morren*, 1830.

C. rectangularis, (*Br.*), *Chod.* Lake, September, 1902 (forma *major*; cells 11–13 μ long, 6–9 μ wide).

Actinastrum, *Lagerh.*, 1882.

A. Hantzschii, *Lag. in Öfvers. af Kgl. Vet.-Akad. Förhandl.*, 1882. Isolated in water-lily pond, September, 1902; isolated in plankton of Thames, August, 1902. New for the British Isles.

Lemmermannia, *Chod.*, 1899.

L. emarginata, *Chod. Alg. Vert. de la Suisse.* Rather rare in lake, pond, and water-lily pond, September, 1902. New for the British Isles.

Tetrastrum, *Chodat*, 1895.

T. **staurogeniaeforme** (*Lemm.*) *Chod. Alg. Vert. de la Suisse* Middle tank of water-lily house, July, 1902.

Scenedesmus, *Meyen*, 1829.

S. **acutus**, *Meyen in Nov. Act.*, xiv., 2, 775, *n.* 4, *t.* xliii., *f.* 32. Laboratory tank, May, 1902; lake, June, 1902; plankton of Thames, August, 1902.

Var. **obliquus**, *Rabh. Alg.*, iii., 64. Same localities as the species; also moat, July, 1902.

Var. **dimorphus**, *Rabh. Alg.*, iii., 64. Side tanks of water-lily house, June, 1902; lake and water-lily pond, September, 1902.

S. **curvatus**, *Bohlin, Algen der Erst. Regnell'schen Exped.* (1897), 23 (*sep.*), *t.* I., *f.* 41–44, *et* 52. Lake and pond, September, 1902. This species has not yet been observed in the British Isles. Cells slightly curved, contents granular; a pyrenoid in each cell. Some specimens come very close to compact specimens of *Crucigenia rectangularis*, which occurred in the same water together with *Scen. curvatus*. It seems possible that both are only forms of the same species, as intermediate stages were observed.

S. **quadricauda**, *Bréb. Alg. Falais.*, 66. Common in all the artificial waters, in the plankton and otherwise, 1902; moat, May, 1902; plankton of Thames, August, 1902; in a glass vessel in the Herb. Dptmt., March, 1902; laboratory tank, July, 1897 (Massee!).

Var. **abundans**, *Kirchn. Algenfl. Schles.*, 98. Middle tank of water-lily house, July, 1902; lake, September, 1902.

S. **Hystrix**, *Lagerh. Pediastr. Protoc. och Palmellaceer*, 1882, 62, *t.* ii., *f.* 18. Water-lily pond, September, 1902.

Coelastrum, *Näg.*, 1849.

C. **microporum** (*Näg.*), *Braun Alg. Unicell.*, 70. Lake and water-lily pond, June–September, 1902.

Kirchneriella, *Schmidle*, 1893.

K. **contorta** (*Schmidle*), *Bohlin*. Isolated amongst *Cladophora* in pond, September, 1902. New for the British Isles.

K. **lunaris** (*Kirchn.*), *Moeb.* Plankton of Thames, August, 1902.

K. **obesa** (*West*), *Schmidle*. Middle tank of water-lily house, July, 1902.

Rhaphidium, *Kütz.*, 1845.

R. **polymorphum**, *Fresen. in Abh. d. Senckenb. Nat. Gesellsch.*, ii., 199.

Var. **aciculare**, *Rabh. Alg.*, iii., 45. Isolated amongst other Algae in side-tanks of water lily house, April–September, 1902; lake, September, 1902.

Var. **falcatum**, *Rabh. loc. cit.* Amongst other unicellular Algae on underside of leaves of *Nelumbium*, water-lily house, June–September, 1902 (mihi !), laboratory tank, July, 1897 (Massee !).

Var. **sigmoideum**, *Rabh. loc. cit.* Middle tank of water-lily house, July, 1902.

R. pyrenogerum, *Chod. Alg. Vert. de la Suisse.*

Var. **falciforme**, *Chod.* Isolated in plankton of Thames, August, 1902. Probably only a form of *R. fasciculatum*, possessing pyrenoids.

Palmella, *Lyngb.*, 1819.

P. mucosa, *Kütz. Phyc. Gen.*, 172. On the stone-work of the fountain in the pond, April–May, 1902 (? probably a resting-stage of *Chlamydomonas*, or an allied genus); forming a greenish, slightly gelatinous stratum on the pebbles in Nos. 7 and 8, June–September, 1902 (?).

Gloeocystis, *Näg.*, 1849.

G. ampla (*Kütz.*), *Rabh. Alg.*, iii., 29. With other Algae on outside walls of water-lily house, April, 1902.

G. rupestris (*Lyngb.*), *Rabh. Krypt. Flor. Sachsen*, 128. On the rocks in the bamboo garden, March, 1902.

G. adnata (*Huds.*), *Näg. Einz. Alg.*, 65, *t.* iv., F. Forming little yellow-brown masses intermingled with other unicellular Algae on outside walls of Aroid house (No. 1), June–September, 1902. As far as I am aware, this species has not previously been described for the British Isles.

Polyedrium, *Näg.*, 1849.

P. tetraedricum, *Näg. Einz. Alg.*, 84, *t.* iv., B., *f.* 3. Water-lily house tanks, June, 1902.

P. hastatum, *Reinsch, Algenfl. Frank.*, 77, *t.* 5, *f.* 3. Middle tank of water-lily house, July, 1902; pond, September, 1902.

P. regulare (*Kütz.*), *Chod. Alg. Vert. de la Suisse.* Middle tank of water-lily house, July, 1902.

Forma **bifurcatum**, *nob.* Spines bifurcated at the ends. Same locality as the species. In my opinion, the two last-named species are merely varieties of *Polyedrium tetraedricum*, Näg. A large number of intermediate forms, not corresponding absolutely with the descriptions of any of these species, was met with. Both have, as far as I am aware, not yet been described for this country.

***P. (Tetraëdron) longispinum** (*Perty*), *Rabh. Alg. Eur.*, iii., 62. (cp. Bennett, loc. cit.)

Eremosphaera, *De Bary*, 1858.

E. viridis, *De Bary Conj.*, 56, *t.* viii., *f.* 26, 27. Laboratory tank (Massee !); plankton of water-lily pond, May, 1902, isolated (mihi !).

Pleurococcus, *Meneg.*, 1842.

P. vulgaris, *Meneg. Nost.*, 38, *t.* 5, *f.* 1. Common on tree-trunks, walls, &c., thoughout the gardens ; on the tree-stumps in the pond, on the stone-work of Temple of Aeolus, on trunks of palms in temperate house.

P. angulosus (*Corda*), *Meneg. Nost.*, *t.* 4, *f.* 5. On the trunk of of a very damp tree, March, 1902 ; on stone sides of pond, March, 1902.

Porphyridium, *Näg.*, 1849.

P. cruentum, *Näg. Einz. Alg.*, 71, *t.* iv., H. On the outside walls of the Aroid house (No. 1), forming a deep purple, gelatinous coating, June, 1902. On rocks in the temperate house, September, 1902 According to Wolle (Freshwater Algae of the United States, 1887, 82), this is the same as *Pleurococcus miniatus* (Ktz.), Näg.

VI. CYANOPHYCEAE.

1. CHROOCOCCACEAE.

Chroococcus, *Näg.*, 1849.

C. cohaerens (*Bréb.*) *Näg. Einz. Alg.*, 46. On damp walls and flower-pots, not rare ; 1902. Also found in Botanic Gardens, Regent's Park (cp. Bennett, loc. cit.).

Gloeocapsa, *Kütz.*, 1843.

G. livida (*Carm.*), *Kütz. Tab. Phyc.*, i., *t.* 21, *f.* 5. Forming a blackish coating on the sides of a tank in one of the pits, February, 1902 ; on the rocks above the water, temperate house pools, March, 1902 ; on woodwork in No. 8, and on walls in No. 13, September, 1902.

G. caldariorum, *Rabh. Alg. Eur.*, ii., 37. On brickwork in pit No. 13*a*, January, 1902 ; *Nepenthes* house, March, 1902.

G. polydermatica, *Kütz. Tab. Phyc.*, i., *t.* 20. Rockery, forming a gelatinous coating on the rocks, March, 1902 ; very common on the walls, &c. of the hothouses (*Victoria regia* house, *Nepenthes* house, tropical fern house, &c.), 1902.

G. quaternata, *Kütz. Tab. Phyc.*, i., *t.* 20, *f.* 1. On the stone sides of a tank and on woodwork in No. 14, March–September, 1902 ; on walls of tropical fern house (No. 2) together with *G. muralis*, Kütz., August, 1902.

G. aeruginosa (*Carm.*), *Kütz. loc. cit.*, i, *t.* 21, *f.* 2. Forming a glaucous-green incrustation on the end wall of the *Nepenthes* house, March, 1902 ; walls of palm house and rocky walls of Aroid house (No. 1), March, 1902.

G. muralis, *Ktz. Tab. Phyc.*, i, *t.* 21, *f.* 1. On woodwork in No. 14, September, 1902. New for the British Isles.

G. dermochroa, *Näg. Einz. Alg.*, 51. On wet stones amongst other blue-green Algae, *Victoria regia* house, September, 1902. New for the British Isles.

G. violacea, *Rabenh. Alg. Eur.*, ii., 41. Forming a greyish-violet incrustation on rocks in palm house, September, 1902. New for the British Isles.

Aphanocapsa, *Näg.*, 1849.

A. virescens (*Hass.*), *Rabh. Alg. Eur.*, ii., 48. On walls, &c., in pits, February–September, 1902; always intermingled with other blue-green forms.

A. rivularis (*Carm.*), *Rabh. loc. cit.*, 49. Amongst other blue-green Algae on wet stones in the *Victoria regia* house, September, 1902.

Microcystis, *Kütz.*, 1833.

M. protogenita (*Bias.*), *Rabh. Alg.*, ii., 51. Intermingled with other blue-green Algae on walls of palm and Aroid (No. 1) houses, March, 1902; plankton of pond, September, 1902; plankton of Thames, August, 1902.

M. marginata (*Meneg.*), *Kirch. Alg. Schl.*, 255. Laboratory tank and lake, amongst filamentous Algae, 1902; amongst other blue-green Algae on wet stones in *Victoria regia* house, September, 1902; plankton of Thames, August, 1902.

Clathrocystis, *Henfrey*, 1856.

C. aeruginosa, *Henf. Micr. Journ.*, 1856, 53, *t.* 4, *f.* 28–36. Plankton of pond, dead, April, 1902 (Chodat !), September, 1902 (mihi !); plankton of Thames, August, 1902. In this season never observed in any considerable quantity.

Coelosphaerium, *Näg.*, 1849.

C. kützingianum, *Näg. Einz. Alg.*, 54, *t.* 1c. Plankton of lake, April, 1902 (Chodat !), common throughout the summer in plankton of lake, pond, &c.

Merismopedia, *Meyen*, 1839.

M. violacea, *Kütz. Spec.*, 472. Amongst other Algae in *Victoria regia* tank, June, 1902.

M. glauca, *Näg. Einz. Alg.*, 55, *t.* 1, D., *f.* 1. Lake, pond, water-lily pond, May–September, 1902; not uncommon.

Tetrapedia, *Reinsch*, 1867.

T. setigera, *Archer in Grevillea*, i., 46, *t.* 3, *f.* 14–17. Isolated amongst *Cladophora* in lake, September, 1902.

Dactylococcopsis, *Hansg.*

D. raphidioides, *Hansg. Prod. Alg. Böhm.*, ii., 139. Forma *furcatum*, nov. form. One of the pointed ends of the S-shaped cells often ends in two short points; chief tank of water-lily house, September, 1902. Species not yet described for England.

Synechococcus, *Näg.*, 1849.

S. aeruginosus, *Näg. Einz. Alg.*, 56, *t.* 1, E., *f.* 1.

Var. **cylindricus,** *nov. var.* Cells 4–5 μ diameter, 2–6 times as long, often slightly bent, cylindrical, with rounded ends, almost pure green in colour ; forming a dark green, highly gelatinous mass on the walls of the tropical fern house, August, 1902.

Gloeothece, *Näg.*, 1849.

G. tepidariorum (*Braun*), *Lagerh. in Öfvers. af Svenska Vetensk.-Akad. Förhandl.*, 1883, *No.* 2, 37–78, *t.* i. Forming a rather thick diffluent layer on the top of a stone wall in the *Nepenthes* house, March, 1902. New for British Isles.

G. linearis, *Näg. Einz. Alg.*, 58, *t.* 1, G. *f.* 2. On walls in the pits belonging to the Orchid houses, September, 1902 ; forms a dirty green to purplish, highly gelatinous stratum.

? **Gloeothece fuscolutea,** *Näg. Einz. Alg.*, 58. On the end wall of *Nepenthes* house, forming little cyst-like masses, March, 1902.

Aphanothece, *Näg.*, 1849.

A. prasina, *Braun in Rabh. Alg.*, *No.* 1752. About the size of a pea ; on the sides of a tank in one of the pits attached to the Orchid houses, September, 1902.

A pallida (*Ktz.*), *Rabenh. Krypt. Fl. Sachs.*, 76. On stones in *Victoria regia* house, September, 1902 ; in pits attached to the Orchid houses, September, 1902. I believe this not to have been described before for the British Isles.

2. NOSTOCHINEAE.

Nostoc, *Vauch.*, 1803.

***N. carneum,** *Ag. Syst. Alg.*, 22. On walls of forcing house (Massee !).

N. spongiaeforme, *Ag. Syst. Alg.*, 22. On stones in tropical fern house, June, 1902 ; on stones in *Victoria regia* house, September, 1902.

N. muscorum, *Ag. Disp. Alg.*, 55. Between moss on the walls of a pit, November, 1901. Of the same green colour as the moss and consequently not very noticeable amongst it ; slightly cartilaginous.

N. humifusum, *Carm. Eng. Fl.*, ii., 399. Forming small roundish lumps about 1in. in diameter on the wall of a pit, November, 1901 ; walls of Aroid house (No. 1)., September, 1902 ; walls of pit belonging to tropical fern house, September, 1902.

***N. commune,** *Vauch. Conf.*, 222, *t.* 16, *f.* 1 *fide.* Wright ! I have not observed this in the Gardens, although it is undoubtedly present.

?**N. rupestre**, *Kütz. Spec. Alg.*, 296. On damp rocks amongst mosses in temperate house, March, 1902.

N. macrosporum, *Meneg. Mon. Nost.*, 116, *t.* 14, *f.* 2. On damp ground in the rockery, January, 1902.

Anabaena, *Bory*, 1823.

A. flos-aquae, *Kütz. Tab. Phyc.*, i., *t.* 94. On lake (Massee !). "This in some seasons forms a black-green slimy scum on the surface of the water, pond" (Wright !). I observed only small quantities on the lake in this season, 1902.

A. variabilis, *Kütz. Phyc. Gen.* Amongst other blue-green Algae on the stonework of the tropical fern house, June, 1902.

A. oscillarioides, *Bory Dict. Hist. Nat.* Forming a compact bluish-green stratum around *Nitella* sp. in a glass vessel in pit of the Herb. Dptmt., February, 1902.

Cylindospermum (*Kütz.*), *Ralfs*, 1850.

***C. macrospermum**, *Kütz. Tab. Phyc.*, i., *t.* 98, *f.* 4. "On soil of plant pots, Herb. Dptmt." (Massee !).

3. LYNGBYACEAE.

Chamaesiphon, *A. Br. et Grun.*, 1864.

C. confervicola, *Br. Rabenh. Alg.*, *No.* 1726. On *Cladophora* in tank in No. 8; on *Rhizoclonium* in streamlet in rockery, September, 1902.

C. incrustans, *Grun. in Rabh. Alg. Eur.*, ii., *p.* 149. On *Oedogonium* in middle tank of water-lily house; on *Rhizoclonium* in streamlet in rockery, September, 1902.

Spirulina, *Link*, 1834.

S. tenuissima, *Kütz. Spec. Alg.*, 236. Water-lily pond, amongst other Algae, September, 1902.

Oscillaria, *Bosc.*, 1800.

O. tenerrima, *Kütz. Tab. Phyc.*, i., *t.* 38, *f.* 8. On brickwork in tropical fern house, January, 1902; on walls of palm house, and in tank in conservatory (No. 4), March, 1902; moat, May, 1902.

O. leptotricha, *Kütz. Tab. Phyc.*, i., *t.* 38, *f.* 9.

> Var. **splendida**, *Grev.* A very fine form; in the temperate house pools, growing attached to the roots of a water-plant and looking like a blue-green *Enteromorpha*, December–April, 1902; on sides of tank in *Victoria regia* house, March, 1902; laboratory tank, attached to submerged parts of water-plants, May, 1902.

?**O. spiralis**, *Carm. Harv. Phyc. Britt.*, *t.* 105 B. Forming a blackish-green stratum on the banks of the lake, March, 1902.

O. subfusca, *Vauch. Conf.*, 193, *t.* 15, *f.* 5. On stonework of fountain in pond, June, 1902.

O. aerugescens, *Drumm. Ann. Nat. Hist.*, 1838, i., 1. Mingled with *Ulothrix variabilis* on the rocks in the temperate house pools, March, 1902; on rocks in *Nepenthes* house, forming an almost blackish stratum, March, 1902; *Victoria regia* tank, June, 1902.

O. tenuis, *Ag. Syst. Alg.*, 60. On damp ground near laboratory, January, 1902. Also found in Bot. Gardens, Regent's Park (cp. Bennett, loc. cit.).

O. limosa, *Ag. Syst. Alg.*, 66. Moat, May, 1902. Also found in Botanic Gardens, Regent's Park (Bennett, loc. cit.). According to W. and G. S. West (Algal Flora of Yorkshire, 1901) this is synonymous with *O. Fröhlichii*, Kütz.

O. irrigua, *Kütz. Phyc. Gen.*, 189. On the wall of a pit, November, 1901.

O. nigra, *Vauch. Conf.*, 192, *t.* 15, *f.* 4. Mingled with *O. splendida* in laboratory tank, May, 1902; in dark steel-blue or almost black masses, attached to *Myriophyllum* all over the lake, September, 1902; also very abundant in the water-lily pond, September, 1902. It here forms a blue-green flaky covering all over the mud at the bottom, from which dense vertical conglomerations of an almost black colour stand off into the water. Some of these frequently get detached and then float about on the surface of the water, often as round black balls, hollow and containing air internally and formed externally of the densely interwoven filaments. These collapse at once when taken out of the water.

***O. chalybea**, *Mert. in Jurg. Alg.* In tank (Massee !).

O. Fröhlichii, *Kütz. Phyc. Gen.*, 189. On earth of flower-pot in pit No. 13A., January, 1902; temperate house pools, May, 1902; forming a blackish stratum on the mud in *Victoria regia* tank, June, 1902; common on the ashes in the tropical fern house and its pits, covering them for some distance with a black, slimy stratum. I have been informed that this Alga does considerable harm to the young plants, especially to the prothallia; also on the ashes and stones in the palm house, September, 1902.

Phormidium, *Kütz.*, 1843.

P. smaragdinum, *Kütz. Tab. Phyc.*, i., 35, *t.* 49, *f.* vi. Forming a dirty green membranous layer on the sides of a tank, containing hot water, in No. 5, March, 1902; on walls in pit of tropical fern house, September, 1902. New for the British Isles.

Microcoleus, *Desm.*, 1823.

M. chthonoplastes, *Thur. in Ann. Sci. Nat.*, 1875, 377. Entangled amongst other Algae on the banks of the lake, January, 1902; brickwork in private grounds, March, 1902; on the ground among moss, Herb. Dptmt., (Massee !).

M. terrestris, *Desm. Pl. Crypt. Exs.*, i. *No.* 55. On moist ground amongst *Vaucheria*, bamboo garden, March, 1902.

Inactis, *Kütz.*, 1843.

I. Cresswelli, *Thur. in Ann. Sci. Nat.*, 1875, 377. On wet moss in one of the pits, August, 1902; growing in upright yellow bundles, about 2 mm. high.

Lyngbya, *Ag. em. Thuret*, 1875.

L. inundata (*Kütz.*), *Cooke Brit. Freshw. Alg.*, 259. Forming a greenish coating on the stonework of a tank in the private grounds at a point subject to the drip of water from a tap, March, 1902; forming a bluish-black stratum on the rocks in the *Nepenthes* house, March, 1902; common on the sides of tanks throughout the gardens (*Victoria regia* tank, Aroid house, &c.).

L. vulgaris, *Kirchn. Alg. Schl.*, 242. Forming a thin, papery, dark olive layer on the sides of a tank in the conservatory, March, 1902; middle tank of water-lily house, September, 1902.

L. papyrina, *Kirchn. Alg. Schl.*, 241. On the sides of a tank below water, pits of Orchid house, September, 1902. New for the British Isles.

L. rupestris (*Ag.*), *Cooke Brit. Freshw. Alg.*, 260. Forming a velvety green layer on the sides of a water tank above the water-level, pit, February, 1902; sides of *Victoria regia* tank, March, 1902.

L. solitaris (*Rabh.*), *Kirchn. Alg. Schl.*, 242. Scattered amongst other forms on stone work in pits of Orchid house, September, 1902. New for the British Isles.

L. hilseana (*Rabh.*), *Kirchn. Alg. Schl.*, 241. On the side of a tank, containing hot water, in one of the pits, October, 1902. New for the British Isles.

L. sudetica (*Nave*), *Kirchn. loc. cit.*, 241. Forming a dark green, thick, membranous stratum on the ledges in No. 13, September, 1902. New for the British Isles.

L. insignis (*Thwaites*). Scattered amongst *Cladophora flavescens* in water-lily pond, April, 1902 (mihi !); in tank (Massee !).

Symploca, *Ktz.*, 1843.

S. thermalis, *Ktz. Phyc. Gen.*, 200. Growing in chinks between the bricks of one of the pits, October, 1902; forms small penicillate, blue-green tufts. As far as I am aware, this is new for the British Isles.

Plectonema, *Thur.*, 1875.

***P. Kirchneri**, *Cooke, Grevillea*, xi., 75. "In ornamental water. Pleasure grounds, Kew." (cp. Cooke, Brit. Freshw. Alg., 264 !)

4. SCYTONEMACEAE.

Scytonema, *Ag.*, 1824.

S. cinereum, *Meneg. in Kütz. Spec.*, 303. "Found on the walls of warm houses in the Royal Botanic Gardens at Kew" (Cooke, loc. cit., 266). This species is very common in the hotter and

damp houses, and is to be well seen in the *Nepenthes* house and in many of the pits. Its appearance is very curious, the colour being very like that of a *Mucor*. The filaments are encrusted with a deposit of lime, giving them a black, opaque appearance under the microscope.

Symphyosiphon, *Kütz.*, 1843.

S. Hoffmanni, *Kütz. Tab. Phyc.*, ii., *t.* 43, *f.* 3. Forming small tufted growths on rocks in the *Nepenthes* house, March, 1902 ; on walls in pit, April, 1902 ; amongst moss in tropical fern house, August, 1902.

Tolypothrix, *Kütz.*, 1843.

T. aegagropila, *Kütz. Tab. Phyc.*, ii., *t.* 32, *f.* 3. Forming numerous brownish circular patches on walls in many of the warmer pits, October, 1902.

Var. **pygmaea**, *Kütz.* Amongst other blue-green Algae on wet stones in *Victoria regia* house, September, 1902.

Var. **muscicola**, *Kütz.* Intermingled with *Gloeocapsa caldariorum* and forming a blackish-green layer on the walls in the *Nepenthes* house, March, 1902 ; also on rocks in the same house.

Var. **Kewensis**, *var. nov.* Filaments only slightly branched ; no branch beneath most of the heterocysts. Heterocysts *single*, yellow in colour, oblong-quadrate in shape, contents often slightly granular, of the same size as the neighbouring cells. Ordinary cells a little shorter or longer than broad, with blue-green to green, granular contents ; filaments at some points distinctly, at others indistinctly, septate. Sheaths colourless with thickish walls, 13 μ in diameter ; cells 10–12 μ in diameter ; heterocysts have the same diameter. When still occupied by the filaments the sheaths are difficult to distinguish. This variety is probably closely allied to var. *muscicola*, Kütz., but differs from it in the number of heterocysts and in the degree of branching. Forming numerous, small, blue-green tufts on mosses in the tropical fern house, June, 1902, (the colour somewhat resembles that of *Scytonema cinereum*).

T. tenuis, *Ktz. Phyc. Gen.*, 228, *n.* 4. On walls in palm house, March, 1902 ; on walls in stove (No. 9), September, 1902 ; forming a dark blue-green stratum on the ledges in the pits, attached to the Orchid houses, September, 1902.

T. Wimmeri (*Hilse*), *Kirchn. Alg. Schl.*, 228. Forms a shining blackish stratum on a ledge in one of the pits attached to the Orchid houses, September, 1902 ; forms a thin, dark olive stratum on the stone floor of Aroid house (No. 1), September, 1902. New for the British Isles.

5. CALOTHRICHACEAE.

Rivularia, *Roth.*, 1824.

R. echinulata, *Berk. Engl. Bot.* On the stone floor of the palm house, and on the sides of the tanks in the water-lily house, September, 1902.

Mastigonema (*Fisher*), *Kirchn.*

M. (velutina, *Wolle?*). Forming a rather thick glaucous-green incrustation on the sides of flower-pots standing out of the water in the middle tank of the water-lily house, September, 1902. This species was later (Freshw. Algae of U.S.A., 242) referred by Wolle to *Lyngbya aestuarii*. It seems more probable to me that it is a young form of some *Tolypothrix*. The specimens found had filaments which never attained any considerable length, and which always possessed a subglobose heterocyst of a light to golden-yellow colour basally. The filaments were broadest at the base, but many of them did not decrease much apically at all. These specimens will be more fully discussed at another place.

VII. BACILLARIALES.

Cyclotella, *Kütz.*, 1833.

C. operculata (*Ag.*), *Ktz. Bac.*, *t.* i., *f.* 1. Pond, lake, water-lily pond, May–September, 1902; common in the plankton.

Coscinodiscus, *Ehrb.*, 1838.

C. radiatus, *Ehrb.* Plankton of Thames at Kew, August, 1902.

Melosira, *Ag.*, 1824.

M. moniliformis (*Müll.*), *Ag. Syst.*, 8. Plankton of Thames at Kew, August, 1902.

M. varians, *Ag. Consp.*, 1830, 64. Amongst *Vaucheria* in moat all the year round; plankton of lake, June, 1902; middle tank of water-lily house, September, 1902 (cells three to four times as long as broad); amongst *Cladophora* in tank of Herb. Dptmt., June, 1902; plankton of Thames at Kew, August, 1902.

M. angulata (*Greg.*), *Rabenh. Alg.*, i., 40. Plankton of Thames at Kew, August, 1902.

Campylodiscus, *Ehrb.*, 1841.

C. noricus, *Ehrb. Abh.*, 1841, 11. Plankton of Thames at Kew, August, 1902.

Surirella, *Turpin*, 1827.

S. biseriata (*Ehrb.*), *Bréb. Alg. Falaise*, *t.* vii. Plankton of Thames at Kew, August, 1902.

S. splendida (*Ehrb.*), *Ktz.*, *t.* vii., *f.* 9. Plankton of pond, May, 1902; plankton of Thames at Kew, August, 1902.

S. ovalis, *Bréb. Cons. Ktz. Bac.*, 61, *t.* 30, *f.* 64. Amongst *Cladophora* on banks of lake, January, 1902; plankton of Thames at Kew, August, 1902.

S. ovata, *Ktz. Bac.*, 62, *t.* 7, *f.* 1–4. Amongst *Tolypothrix* and *Gloeocapsa* on walls of tropical fern house, June, 1902.

Cymatopleura, *Sm.*, 1853.

C. elliptica (*Bréb.*), *Sm. Diat.*, i., 37, *t.* 10, *f.* 80. Moat, May, 1902.

C. Solea (*Bréb.*), *Sm. Diat.*, i., 36, *t.* 10, *f.* 78. Laboratory tank, lake, temperate house pools, May-August, 1902; plankton of Thames at Kew, August, 1902.

Epithemia, *Bréb.*, 1838.

E. turgida (*Ehrb.*), *Ktz. Bac.*, 34, *t.* 5, *f.* 14. Lake, September, 1902.

E. Westermanni (*Ehrb.*), *Ktz. Bac.*, *t.* 5, *f.* 12 et., *t.* 30, *f.* 4. Amongst *Gloeocapsa* on walls of tropical fern house, August, 1902; amongst blue-green Algae on stones in *Victoria regia* house, September, 1902.

Cymbella, *Ag.*, 1830.

C. gastroides, *Ktz. Bac.*, 73, *t.* 6, *f.* 4b. Plankton of Thames at Kew, August, 1902.

C. affinis, *Ktz. Bac.*, 80, *t.* 6, *f.* 15. Laboratory tank, March, 1902.

C. ventricosa, *Ag. Consp. crit. Diat.*, i., 9. Amongst *Oscillaria*, &c., on walls of pit belonging to tropical fern house, September, 1902; amongst *Cladophora* in pit, Herb. Dptmt., September, 1902.

Cocconema, *Ehrb.*, 1829.

C. cymbiforme (*Ktz.*), *Ehrb. Abh.*, 1835. On *Cladophora*, temperate house pools, March, 1902.

C. tumidum, *Bréb. in Ktz. Spec.*, 1849, 60. Middle tank of water-lily house, July, 1902; temperate house pools, September, 1902.

Encyonema, *Ktz.*, 1834.

E. prostratum (*Berk.*), *Ralfs in Ann. and Mag.*, 182, *t.* 18, *f.* 3. Amongst *Ulothrix* in pond, March, 1902.

Amphora, *Ehrb.*, 1831.

A. coffeaeformis (*Ag.*), *Ktz. Bac.*, 108, *t.* 5, *f.* 37. Amongst *Gloeocapsa* on walls of tropical fern house and of *Victoria regia* house, August, 1902.

A. ovalis, *Ktz. Bac.*, 107, *t.* 5, *f.* 35 et 39. Plankton of Thames at Kew, August, 1902.

Cocconeis, *Ehrb.*, 1835.

C. **Pediculus**, *Ehrb. Inf.*, 194. *t.* 21, *f.* 11. On *Cladophora* in tank of pit, April, 1902; on *Rhizoclonium* in streamlet in rockery, September, 1902.

C. **Placentula**, *Ehrb. Inf.*, 194, *n.* 265. Laboratory tank, March, 1902.

Achnanthes, *Bory*, 1822.

A. **minutissima**, *Ktz. Alg. Exs. aquae dulc.*, *n.* 75. On *Cladophora* in pond and temperate house pools, September, 1902.

A. **trinodis** (*Arnott*), *Grun.* Amongst *Cladophora* on banks of lake, January, 1902. As far as I am aware, this is new for the British Isles.

Rhoicosphenia, *Grunow*, 1860.

R. **curvata** (*Ktz.*), *Rabenh. Alg.*, i., 112.

Var. **aquatica**, *Ktz.* Growing on *Cladophora glomerata* L., in water-lily pond, December, 1901; on *Cladophora* in tank in No. 8, and in pond, September, 1902; laboratory tank, March, 1902.

Var. **salina**, *Ktz.* On *Cladophora* in lake, September, 1902.

Fragilaria (*Lyngb.*), *Ag.*, 1824.

F. **capucina**, *Desm. ed.* i., *n.* 453. In tank in pit of Herb. Dptmt. amongst *Cladophora*, 1902.

F. **mutabilis** (*Sm.*), *Grun. in Wien. Verh.*, 1862, *p.* 369. Plankton of Thames at Kew, August, 1902.

F. **virescens**, *Ralfs Ann. and Mag.*, xii., *t.* 2, *f.* 6. Lake, May–September, 1902; plankton of Thames, August, 1902.

F. **Harrisonii**, *Sm. Diat.*, ii., 18. Amongst *Cladophora* on banks of lake, January, 1902.

Diatoma, *De Candolle*, 1805.

D. **Ehrenbergii**, *Ktz. Bac.*, *t.* 17, *f.* xvii. 1–3. Amongst *Cladophora* in temperate house pools, March, 1902.

Rhaphoneis, *Ehrb.*, 1844.

R. **Rhombus**, *Ehrb. Abh.*, 1844, *p.* 87. Amongst *Cladophora* on banks of lake, January, 1902; plankton of Thames at Kew, August, 1902.

Synedra, *Ehrb.*, 1831.

S. **longissima**, *Sm. Diat.*, i., 72, *t.* 12, *f.* 95. Plankton of pond, April, 1902.

S **pulchella**, *Ktz. Bac.*, 68, *t.* 29, *f.* 37. On *Rhizoclonium* in the streamlet in the rockery, September, 1902.

S. Ulna, *Ehrb. Inf.*, 211, *n.* 295, *t.* 17, *f.* 1. Lake, June–September, 1902; plankton of Thames at Kew, August, 1902.

S. splendens, *Ktz. Bac.*, 66, *t.* 14, *f.* 16. On *Spirogyra*, &c., in laboratory tank, on *Cladophora* in lake and temperate house pools, August, 1902.

S. Acus, *Ktz. Bac.*, 68, *t.* 15, *f.* 7. Amongst *Mesocarpus* in lake, May, 1902; plankton of Thames at Kew, August, 1902.

Var. **delicatissima**, *Sm.* Plankton of Thames at Kew, August, 1902.

Asterionella, *Hassall*, 1855.

A gracillima, *Heib. Consp.*, 68, *t.* 6, *f.* 19. Plankton of Thames at Kew (isolated), August, 1902. Abundant in plankton of Thames in December, 1902.

Nitzschia, *Hassall*, 1845.

N. Amphioxys (*Ehrb.*), *Sm. Diat.*, i., 41, *t.* 13, *f.* 105. Amongst *Cladophora* on banks of lake, January, 1902.

N. sigmoidea (*Nitzsch*), *Sm. Diat.*, i. 38, *t.* 13, *f.* 104. Lake and water-lily pond, September, 1902; plankton of Thames at Kew, August, 1902.

N. linearis (*Ag.*), *Sm. Diat.*, i., 39, *t.* 13, *f.* 110. Lake and water-lily pond, September, 1902.

Nitzschiella, *Rabenh.*, 1864.

N. acicularis (*Ktz.*), *Rabenh. Alg.*, i., 164. Lake and water-lily pond, September, 1902.

Navicula, *Bory*, 1822.

N. cuspidata, *Ktz. Bac.*, 94, *t.* 3, *f.* 24, *et* 37. Amongst *Oscillaria nigra* in water-lily pond, September, 1902.

N. elliptica, *Ktz. Bac.*, 98, *t.* 30, *f.* 55.

Forma **minor**, *Rabenh.* Middle tank of water-lily house, September, 1902.

N. Bacillum, *Ehrb. Verh.*, 130, *t.* 4, v., *f.* 8. Amongst *Synechococcus* and *Gloeocapsa*, on walls of tropical fern house, August, 1902.

N. laevissima, *Ktz. Bac.*, 96, *t.* 21, *f.* 14.

Var. **rectangularis**, *Rabenh.* Amongst *Oscillaria nigra* in lake and water-lily pond, September, 1902.

N. minutissima, *Grun. in Wien. Verh.*, 1860, 552, *t.* 2, *f.* 3. Amongst a mass of *Euglenae* on moist gravel of laboratory tank, August, 1902; on the glass windows of many of the hotter houses (*e.g.*, water-lily house),—almost colourless, present all the year round; middle tank of water-lily house, September, 1902.

N. amphisbaena, *Bory Encycl. méth.*, 1824. Plankton of Thames at Kew, August, 1902.

N. appendiculata, *Ktz. Bac.*, 93, *t.* 3, *f.* 28, *et. t.* 4, *f.* 1 and 2. Very abundant in all the artificial waters all the year round ; present in enormous numbers amongst *Oscillaria nigra* in lake, September, 1902.

N. exilis (*Ktz.*), *Grun. loc. cit.*, 553, *t.* 2, *f.* 30, a–d. Amongst a mass of *Euglenae* on moist gravel of laboratory tank, September, 1902.

N. angustata, *Sm. Diat.*, i., 52, *t.* 17, *f.* 156. Amongst *Vaucheria* on earth of flower-pot in temperate fern house, August, 1902.

N. dicephala, *Ehrb. Inf.*, 1838, *p.* 185. Lake and water-lily pond, September, 1902.

Forma **minor** (length 17 μ). Middle tank of water-lily house and lake, September, 1902.

Pinnularia, *Ehrb.*, 1843.

P. nobilis, *Ehrb. Abh.*, 1840, 20. Middle tank of water-lily house, September, 1902.

P. viridis (*Ehrb.*), *Rabenh. Süssw. Diat.*, 42, *t.* 6, *f.* 4. Plankton of Thames at Kew, August, 1902 ; side tanks of water-lily house, April, 1902.

P. radiosa (*Ktz.*), *Rabenh. loc. cit.*, 43, *t.* 6, *f.* 9. Amongst *Cladophora* on banks of lake, January, 1902.

P. viridula (*Ktz.*), *Rabenh. loc. cit* Amongst a mass of *Euglenae* on moist gravel of laboratory tank and amongst *Vaucheria* on earth of flower pot in temperate fern house, September, 1902.

Pleurosigma, *Smith*, 1853.

P. attenuatum (*Ktz.*), *Sm. loc. cit.*, i., 68, *Pl.* 22, *f.* 216. Moat, May, 1902 ; lake, September, 1902 ; plankton of Thames at Kew, August, 1902.

P. acuminatum (*Ktz.*), *Grun. in Wien. Verh.*, 1860. Temperate house pools, June, 1902 ; pond, September, 1902.

Schizonema, *Agardh*, 1824.

S. neglectum (*Thw.*), *Rabenh. Alg. Eur.*, i., 265. Amongst *Cladophora* in temperate house pools, March, 1902.

Gomphonema, *Ag.*, 1824.

G. tenellum, *Ktz. Bac.*, 84, *t.* 8, *f.* viii., 6 *et t.* 14, *f.* vii., 5 *et* 6. On *Cladophora* in pond and laboratory tank, September, 1902.

G. subramosum, *Ag. in Regensb.* "*Flora,*" 1830, *f.* 5 *et* 9. On *Cladophora* in water-lily pond, April, 1902.

G. constrictum, *Ehrb. Abh.*, 1830. On *Cladophora*, temperate house pools, March, 1902; on *Vaucheria*, lake, April, 1902; on *Cladophora*, laboratory tank, September, 1902; on *Cladophora* in tank, Herb. Dptmt., September, 1902.

G. acuminatum, *Ehrb. Inf.*, 217, *n.* 308, *t.* 18, *f.* 4. On *Cladophora*, lake, January, 1902.

G. intricatum, *Ktz. Bac.*, 87, *t.* 9, *f.* 4. Side tanks of water-lily house, April, 1902.

Tabellaria, *Ehrb.*, 1839.

T. fenestrata, (*Lyngb.*), *Ktz. Bac.*, *t.* 17, *f.* 22; *t.* 18, *f.* 2 *et. t.* 30, *f.* 73. Amongst *Mesocarpus* in lake; also in temperate house pools, May, 1902; tank in No. 8, September, 1902; plankton of lake, June, 1902.

APPENDIX.

FLAGELLATAE.

1. CHRYSOMONADINEAE.

Chrysococcus, *Klebs.*

C. rufescens, *Klebs.* Plankton of lake, April, 1902 (Chodat!)

Dinobryon, *Ehrb.*

D. Sertularia, *Ehrb.* Plankton of lake and water-lily pond, June, 1902; plankton of Thames at Kew, August, 1902

Synura, *Ehrb.*

S. Uvella, *Ehrb.* Plankton of lake, April, 1902 (Chodat!).

S. Volvox (*Ehrb.*), *Kirchn.* Plankton of water-lily pond, May, 1902; also of lake, April, 1902; plankton of Thames, August, 1902.

2. CRYPTOMONADINEAE.

Cryptomonas, *Ehrbg.*

C. erosa, *Ehrbg.* Plankton of pond and lake, April, 1902 (Chodat!).

3. EUGLENINAE.

Euglena, *Ehrbg.*

E. viridis, *Ehrb.* Plankton of lake, April, 1902 (Chodat!); plankton of moat and laboratory tank, May, 1902; side tanks of

water-lily house, April, 1902 ; forming the greater part of a green scum on the lake, July, 1902 ; amongst *Sphagnum* in Orchid house, September, 1902 ; plankton of Thames at Kew, August, 1902.

Phacus, *Nitzsch.*

* **P. pleuronectes,** *Nitzsch.* Plankton of lake, April, 1902 (Chodat !) ; plankton of moat and pond, July, 1902 ; amongst other Algae in side tanks of water-lily house, April, 1902 ; plankton of Thames at Kew, August, 1902.

P. longicauda, *Ehrb.* *Victoria regia* tank, June, 1902 ; pond, September, 1902.

APPENDIX.

INSECTIVORA.

Sorex vulgaris, *L.* "Common Shrew." Found by Mr. George Nicholson, F.L.S., in Q. in 1904.

INSECTA.

COLEOPTERA.

Additional list by D. Sharp, M.B., F.R S.

ADEPHAGA.

Notiophilus substriatus, *Wat.*

Nebria brevicollis, *F.*

Harpalus rufibarbis, *F.*

Platyderus ruficollis, *Marsh.*

Pterostichus cupreus, *L*

P. niger, *Schall.*

P. striola, *F.*

Amara trivialis, *Gyll.*

A. plebeia, *Gyll.*

Calathus piceus, *Marsh.*

Bembidium fermoratum, *Sturm.*

B. littorale, *Ol.*

STAPHYLINIDÆ.

Quedius lateralis, *Grav.*

Q. molochinus, *Grav.*

Ocyphus olens, *Müll.*

Clavicornia.

Choleva velox, *Spence.*

Meligethes æneus, *F.*

Dermestes vulpinus, *F.*

Byrrhus pilula, *L.* var.

Lamellicornia.

Aphodius fimetarius, *L.*

A. granarius, *L.*

Cetonia aurata, *L.*

Gnorimus nobilis, *L.* The most interesting species in the whole list. It is rare, but was formerly occasionally met with near London. It was, however, supposed no longer to occur till a specimen was captured on the coat of a visitor to the North Gallery a few years ago.

Serricornia.

Melanotus rufipes, *Herbst.*

Athous hæmorrhoidalis, *F*

Agriotes lineatus, *L.*

Telephorus rusticus, *Fall.*

T. lituratus, *Fall.*

Longicornia.

Gracilia minuta, *F.*

Rhynchophora.

Otiorrhynchus raucus, *F.*

O. picipes, *F.*

O. sulcatus, *F.*

Exomias araneiformis, *Schrank.*

Phyllobius argentatus, *L.*

Sitones hispidulus, *F.*

Hypera nigrirostris, *F.*

Curculio abietis, *F*

Ceuthorrhynchus contractus, *Marsh.*

FUNGI.

The following species not previously met with in Britain are figured in the *Kew Bulletin* for 1897 from specimens found at Kew :—

Aseroe rubra, *La Bill.* *Infra*, pp. 103, 139.

Botrytis corolligena, *C. & M.* *Infra*, pp. 175.

Chitonia rubriceps, *C. & M.* *Infra*, pp. 103, 124.

Clavaria kewensis, *Mass.* *Infra*, p. 137.

Flammula purpurata, *C. & M.* *Infra*, pp. 103, 122.